

# UCDAVIS



*general catalog*  
1990-91

## HOW TO USE THIS CATALOG

The UC Davis *General Catalog* is a source of information about the Davis campus course offerings, academic programs, campus facilities, services, fees, requirements, and campus life. While we attempt to provide information for all of these uses, you may find that some information you need is not given. Therefore, throughout the book, we refer to other publications available from individual offices or departments. In the Address Directory you will find a list of the most frequently questioned offices and their addresses. (Please refer to the Index for locations of other offices or department addresses.) In the Appendix, there is a list of major publications and where you can request them.

The *General Catalog* is divided into four major sections:

- Information about the University and the campus, student services, fees, admission, and scholastic and degree requirements
- Information about individual schools and colleges
- Descriptions of specific courses of study, undergraduate major requirements and courses offered, graduate study, and lists of the faculty in departments and programs
- Appendix and Index

**If you are a prospective student**, the first section of the catalog will answer your questions about the Davis campus—what it's like and what makes it special. You should supplement this impression by reading, in the second section, the description of the college or school which interests you. Section three is intended to answer the question, "What does UCD offer to help

me reach my goals?" If you are a prospective freshman or international student, you may find it helpful to look over the glossary of unfamiliar terms in the Appendix. The names of some majors may not convey to you what academic areas courses cover, so check the lists of courses offered to satisfy the requirements of any unfamiliar major. Department chairpersons, program directors, major advisers, or any faculty member listed with these major offerings would be happy to answer any further questions you might have.

**Prospective graduate students** might also wish to send for the *Announcement of the Graduate Division* (Graduate Division Office, 252 Mrak Hall) which provides descriptions of graduate programs and requirements (but no course listings).

**Current students** should refer to the *General Catalog* throughout their years here to answer specific questions on regulations, requirements, and course offerings. Although every effort is made to keep the *General Catalog* correct and current, inevitably there will be some changes in courses offered or instructors assigned. You should, therefore, check the quarterly *Class Schedule and Room Directory* for the up-to-date list of courses offered.

**Advisers of prospective students** may wish to send for the *Planning Guide to Majors*, distributed by the Office of Relations with Schools, for more comprehensive information on programs and their requirements.

We are always trying to make the *General Catalog* more helpful, so please let us know of difficulties you encounter in using it or send us your suggestions for improvement (Publications Office, Repro Graphics Building, or Office of the Registrar, 117 Mrak Hall).

# UC DAVIS

## General Catalog 1990-91



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**Information herein is subject to revision.**

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

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.

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## ADDRESS DIRECTORY

University of California  
Davis, California 95616  
(916) 752-1011 (main campus number)

**Office of the Chancellor**  
Mrak Hall  
916-752-2065

**College of Agricultural and Environmental Sciences**  
228 Mrak Hall  
916-752-0107

**College of Engineering**  
2132 Bainer Hall  
916-752-0553

**College of Letters and Science**  
150 Mrak Hall  
916-752-0392

**Graduate Division**  
252 Mrak Hall  
916-752-0650

**School of Law**  
1011 King Hall  
916-752-0243

**Graduate School of Management**  
308 Voorhies Hall  
916-752-7362

**School of Medicine**  
Medical Sciences 1C  
916-752-0331

**School of Veterinary Medicine**  
1018 Haring Hall  
916-752-1360

**Office of Summer Sessions**  
44 Mrak Hall  
916-752-1647

**University Extension**  
1333 Research Park Drive  
916-752-0880

### Admissions

**Undergraduate:** Office of Admissions  
175 Mrak Hall  
916-752-2971  
EOP Office of Admissions  
175 Mrak Hall  
916-752-2993

**Graduate:** Graduate Division Admissions  
252 Mrak Hall  
916-752-0655

**Law:** School of Law Admissions  
115 King Hall  
916-752-6477

**Management:** Graduate School of Management  
311 Voorhies Hall  
916-752-7399

**Medicine:** School of Medicine Admissions  
Medical Sciences 1C  
916-752-2717

**Veterinary Medicine:** School of Veterinary Medicine Admissions  
1044 Haring Hall  
916-752-1383

**Office of the Registrar**  
124 Mrak Hall  
916-752-2973  
(for registration information, transcripts, the *General Catalog*)

**Financial Aid Office**  
North Hall  
916-752-2390  
(undergraduate and graduate loans, grants, employment information)

**Scholarship Office**  
207 North Hall  
916-752-2397  
(undergraduate scholarships)

### Fellowships and Graduate Scholarships

Graduate Division  
252 Mrak Hall  
916-752-7481

### Teaching and Research Assistantships

Write to department or group concerned. Addresses given in the Announcement of the Graduate Division.

### Housing

**Community:** Student Housing Office  
916-752-2483

**Residence Halls:** Student Housing Office  
916-752-2033

**Student Family Housing:** Orchard Park  
916-752-4000

### ASUCD (Associated Students UCD)

3rd floor, Memorial Union  
916-752-1990

### Disability Resource Center

101 Silo Student Center  
916-752-3184 (voice), 916-752-6889 (telephone device for the speech and hearing impaired)

### Memorial Union Information Desk

916-752-2222

### News Service

334 Mrak Hall  
916-752-1930

### Relations with Schools/EOP Outreach Services

2828 Chiles Road  
916-757-3108

### Residency Matters, Attorney in

590 University Hall  
University of California  
Berkeley, CA 94720

### Student Health Service

54A Cowell Student Health Center  
916-752-2300 (voice, and telephone device for the speech and hearing impaired)

### Information Services Office

129 Mrak Hall  
916-752-0539  
(campus tours, maps, and information)

## ACADEMIC CALENDAR\*

5

	FALL 1990	WINTER 1991	SPRING 1991	FALL 1991
Pick up registration and course enrollment materials (all continuing students)	May 31-Aug. 3	Nov. 5-9 (1990)	Feb. 11-15	May 30-Aug. 2
Faculty advisers available to all students	May 31-June 1	Nov. 8-9	Feb. 14-15	May 30-31
Turn in course enrollment forms and student data card (all continuing students)	May 31-Aug. 3	Nov. 5-9	Feb. 11-15	May 30-Aug. 2
Turn in fees along with fee statement (all continuing students)	May 31-Aug. 17	Nov. 5-21	Feb. 11-Mar. 1	May 30-Aug. 16
<b>Quarter begins</b>	<b>Sept. 24, Mon</b>	<b>Jan. 3, Thur</b>	<b>Mar. 28, Thur</b>	<b>Sept. 23, Mon</b>
Orientation and testing	Sept. 24-26	Jan. 3-4	Mar. 28-29	Sept. 23-25
In-Person Registration	Sept. 24-25	Jan. 3-4	Mar. 28-29	Sept. 23-24
In-Person Enrollment	Sept. 26	Jan. 4	Mar. 28	Sept. 25
Final day to petition for reclassification to resident status	Sept. 27	Jan. 7	Apr. 2	Sept. 26
<b>Instruction begins</b>	<b>Sept. 27, Thur</b>	<b>Jan. 7, Mon</b>	<b>Apr. 1, Mon</b>	<b>Sept. 26, Thur</b>
Final day	Oct. 10, Wed	Jan. 18, Fri	Apr. 12, Fri	Oct. 9, Wed
• of <i>late registration</i>				
• for filing petitions to change status from <i>part-time</i> to <i>full-time</i> student, or vice versa				
• for filing petitions to <i>add</i> courses to study list without paying a \$3 service fee				
• for filing petitions for <i>PELP</i>				
Final day	Oct. 31, Wed	Feb. 8, Fri	May 3, Fri	Oct. 30, Wed
• to petition to <i>add or drop</i> courses (thereafter permission may be granted only by the dean of your school or college and only under exceptional circumstances)				
• to file petitions with the dean of your college or school to take courses on a <i>P/NP</i> basis. Exceptions rarely approved				
• to file petitions with the Dean of the Graduate Division to take courses on a <i>S/U</i> basis				
Deadline for filing Independent Study Program project proposal form with the Academic Senate Committee on Courses of Instruction	July 13	Oct. 10 (1990)	Jan. 18	April 12
<b>Instruction ends</b>	<b>Dec. 7, Fri</b>	<b>Mar. 15, Fri</b>	<b>June 6, Thur</b>	<b>Dec. 6, Fri</b>
Final examinations	Dec. 10-15	Mar. 18-23	June 8-14	Dec. 9-14
<b>Quarter ends</b>	<b>Dec. 15, Sat</b>	<b>Mar. 23, Sat</b>	<b>June 14, Fri</b>	<b>Dec. 14, Sat</b>
Commencement			Mid-June	
<b>Academic and Administrative Holidays</b>	Nov. 22-23 Dec. 24-25 Dec. 31-Jan. 1	Jan. 21 Feb 18 Mar. 25	May 27	Nov. 28-29 Dec 24-25 Dec. 31-Jan. 1
<b>Summer Session I</b> June 24-Aug. 2, 1991				
<b>Summer Session II</b> Aug. 5-Sept. 13, 1991				

\*Dates are subject to change and should be checked with appropriate *Class Schedule and Room Directory*. Additional deadlines can be found in the chapters following.

Note: Thursday, March 14, and Thursday, June 6, treated as Monday for class schedule purposes.

## DEGREES OFFERED BY UC DAVIS

Undergraduate majors and professional studies are administered by the colleges and schools listed. All graduate programs are administered by the Graduate Division.

Major or Discipline	Degree*	Administering School or College
Aeronautical Science and Engineering	B.S.	College of Engineering
Afro-American Studies	A.B.	College of Letters & Science
Agrarian Studies	B.S.	College of Agricultural & Environmental Sciences
Agricultural and Environmental Chemistry	M.S., Ph.D.	
Agricultural Economics	M.S., Ph.D.	
Agricultural and Managerial Economics	B.S.	College of Agricultural & Environmental Sciences
Agricultural Education	B.S., Credential	College of Agricultural & Environmental Sciences
Agricultural Engineering	B.S.	College of Engineering
Agricultural Engineering: Aquaculture and Fisheries Option	B.S.	College of Engineering
Agricultural Engineering: Food Engineering Option	B.S.	College of Engineering
Agricultural Engineering: Forest Engineering Option	B.S.	College of Engineering
Agricultural Science and Management	B.S.	College of Agricultural & Environmental Sciences
Agronomy	M.S.	
American Studies	A.B.	College of Letters & Science
Animal Behavior	Ph.D.	
Animal Science	B.S., M.A.M., M.S.	College of Agricultural & Environmental Sciences
Anthropology	A.B. or B.S., M.A., Ph.D.	College of Letters & Science
Applied Mathematics	M.S., Ph.D.	
Applied Behavioral Sciences	B.S.	College of Agricultural & Environmental Sciences
Art	M.F.A.	
Art History	A.B.	College of Letters & Science
Art Studio	A.B.	College of Letters & Science
Atmospheric Science	B.S., M.S., Ph.D.	College of Agricultural & Environmental Sciences
Avian Sciences	B.S., M.S.	College of Agricultural & Environmental Sciences
Biochemistry	B.S., M.S., Ph.D.	Colleges of Agricultural & Environmental Sciences or Letters & Science
Biological Sciences	A.B. or B.S.	Colleges of Agricultural & Environmental Sciences or Letters & Science
Biomedical Engineering	M.S., Ph.D.	
Biophysics	M.S., Ph.D.	
Botany	A.B. or B.S.	Colleges of Agricultural & Environmental Sciences or Letters & Science
Business Administration	M.B.A.	
Cell and Developmental Biology	Ph.D.	Graduate School of Management
Chemical Engineering	B.S.	
Chemical Engineering or Materials Science and Engineering	B.S.	College of Engineering
Chemistry	A.B. or B.S., M.S., Ph.D.	College of Letters & Science
Chicano Studies	A.B.	College of Letters & Science
Child Development	M.S.	
Civil Engineering	B.S.	College of Engineering
Civil Engineering or Materials Science and Engineering	B.S.	College of Engineering
Classical Civilization	A.B.	College of Letters & Science
Classics	M.A.	
Community Development	M.S.	
Community Nutrition	B.S.	College of Agricultural & Environmental Sciences
Comparative Literature	A.B., M.S., Ph.D.	College of Letters & Science
Comparative Pathology	M.S., Ph.D.	
Computer Science	M.S., Ph.D.	
Computer Science and Engineering	B.S.	College of Engineering
Computer Science	B.S.	College of Letters & Science
Consumer Food Science	B.S.	College of Agricultural & Environmental Sciences
Design	B.S.	College of Agricultural & Environmental Sciences
Dietetics	B.S.	College of Agricultural & Environmental Sciences
Dramatic Art	A.B., M.A., M.F.A., Ph.D.	College of Letters & Science
Earth Sciences and Resources	M.S., Ph.D.	
East Asian Studies	A.B.	College of Letters & Science
Ecology	M.S., Ph.D.	
Economics	A.B., M.A., Ph.D.	College of Letters & Science
Education	M.A., M.Ed., credential	
Electrical Engineering	B.S.	College of Engineering
Electrical Engineering or Materials Science and Engineering	B.S.	College of Engineering
Endocrinology	M.S., Ph.D.	
Engineering	M.Engr., M.S., D.Engr., Ph.D.	College of Letters & Science
English	A.B., M.A., Ph.D.	College of Agricultural & Environmental Sciences
Entomology	B.S., M.S., Ph.D.	College of Agricultural & Environmental Sciences
Environmental Biology and Management	B.S.	College of Agricultural & Environmental Sciences
Environmental Policy, Analysis, and Planning	B.S.	College of Agricultural & Environmental Sciences
Environmental Toxicology	B.S.	College of Agricultural & Environmental Sciences
Exercise Science	M.S.	College of Agricultural & Environmental Sciences

Fermentation Science	B.S.	College of Agricultural & Environmental Sciences
Fiber and Polymer Science	B.S.	College of Agricultural & Environmental Sciences
Food Biochemistry	B.S.	College of Agricultural & Environmental Sciences
Food Science	B.S., M.S., Ph.D.	College of Agricultural & Environmental Sciences
French	A.B., M.A., Ph.D.	College of Letters & Science
Genetics	B.S., M.S., Ph.D.	Colleges of Agricultural & Environmental Sciences or Letters & Science
Geography	A.B. or B.S., M.A., Ph.D.	College of Letters & Science
Geology	A.B. or B.S., M.S., Ph.D.	College of Letters & Science
German	A.B., M.A., Ph.D.	College of Letters & Science
Greek	A.B.	College of Letters & Science
History	A.B., M.A., M.A.T., Ph.D.	College of Letters & Science
History of Art	M.A.	College of Letters & Science
Horticulture	M.S.	
Human Development	B.S., Ph.D.	College of Agricultural & Environmental Sciences
Immunology	M.S., Ph.D.	
International Agricultural Development	B.S., M.S.	College of Agricultural & Environmental Sciences
International Relations	A.B.	College of Letters & Science
Italian	A.B.	College of Letters & Science
Landscape Architecture	B.S.	College of Agricultural & Environmental Sciences
Latin	A.B.	College of Letters & Science
Law	J.D.	School of Law
Linguistics	A.B., M.A.	College of Letters & Science
Materials Science and Engineering	B.S.	College of Engineering
Mathematics	A.B. or B.S., M.A., M.A.T., Ph.D.	College of Letters & Science
Mechanical Engineering	B.S.	College of Engineering
Mechanical Engineering or Materials Science and Engineering	B.S.	College of Engineering
Medicine	M.D.	School of Medicine
Medieval Studies	A.B.	College of Letters & Science
Microbiology	A.B. or B.S., M.S., Ph.D.	Colleges of Agricultural & Environmental Sciences or Letters & Science
Music	A.B., M.A., M.A.T., Ph.D.	College of Letters & Science
Native American Studies	B.S.	College of Letters and Science
Neurobiology	Ph.D.	
Nutrition	M.S., Ph.D.	
Nutrition Science	B.S.	College of Agricultural & Environmental Sciences
Pharmacology and Toxicology	M.S., Ph.D.	
Philosophy	A.B., M.A., Ph.D.	College of Letters & Science
Physical Education	A.B. or B.S., M.A.	College of Letters & Science
Physics	A.B. or B.S., M.S., Ph.D.	College of Letters & Science
Physics, Applied	B.S.	College of Letters & Science
Physiology	B.S., M.S., Ph.D.	Colleges of Agricultural & Environmental Sciences or Letters & Science
Plant Biology	M.S., Ph.D.	
Plant Pathology	M.S., Ph.D.	
Plant Protection and Pest Management	M.S.	
Plant Science	B.S.	College of Agricultural & Environmental Sciences
Political Science	A.B., M.A., Ph.D.	College of Letters & Science
Political Science—Public Service	A.B.	College of Letters & Science
Preventive Veterinary Medicine	M.P.V.M.	School of Veterinary Medicine
Psychology	A.B. or B.S., M.A., Ph.D.	College of Letters & Science
Range and Wildlands Science	B.S.	College of Agricultural & Environmental Sciences
Religious Studies	A.B.	College of Letters & Science
Resource Sciences	B.S.	College of Agricultural & Environmental Sciences
Rhetoric and Communication	A.B., M.A.	College of Letters & Science
Russian	A.B., M.A.	College of Letters & Science
Sociology	A.B., M.A., Ph.D.	College of Letters & Science
Sociology—Organizational Studies	A.B.	College of Letters & Science
Soil Science	M.S., Ph.D.	
Soil and Water Science	B.S.	College of Agricultural & Environmental Sciences
Spanish	A.B., M.A., Ph.D.	College of Letters & Science
Statistics	A.B. or B.S., M.S., Ph.D.	College of Letters & Science
Textiles	M.S.	
Textiles and Clothing	B.S.	College of Agricultural & Environmental Sciences
Vegetable Crops	M.S.	
Veterinary Medicine	D.V.M.	School of Veterinary Medicine
Water Science	M.S.	
Wildlife and Fisheries Biology	B.S.	College of Agricultural & Environmental Sciences
Women's Studies	A.B.	College of Letters & Science
Zoology	A.B. or B.S., M.A., Ph.D.	Colleges of Agricultural & Environmental Sciences or Letters & Science

\*A.B.—Bachelor of Arts, B.S.—Bachelor of Science, M.A.—Master of Arts, M.A.M.—Master of Agricultural Management, M.A.T.—Master of Arts in Teaching, 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.P.V.M.—Master of Preventive Veterinary Medicine, M.S.—Master of Science, D. Engr.—Doctor of Engineering, Ph.D.—Doctor of Philosophy, J.D.—Doctor of Law, M.D.—Doctor of Medicine, D.V.M.—Doctor of Veterinary Medicine.

# Introduction

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## THE DAVIS CAMPUS

Theodore L. Hullar, chancellor of UC Davis, administers this campus of more than 22,500 students and over 1,700 teaching faculty.

The Davis campus has undergraduate colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science. The Graduate Division administers graduate study and research at all schools and colleges. Professional studies are carried on at the schools of Law, Management, Medicine, and Veterinary Medicine. Approximately 5,300 students are engaged in graduate or professional study.

The University of California, Davis is accredited by the Accrediting Commission for Senior Colleges and Universities of the Western Association of Schools and Colleges, an institutional accrediting body recognized by the Council on Postsecondary Accreditation and the U.S. Department of Education. UC Davis is also accredited by the Association of American Law Schools, Association of American Medical Colleges, Council on Education of the American Veterinary Medical Association, Engineering Accreditation Commission of the Accreditation Board of Engineering and Technology, American Chemical Society, American Society of Landscape Architects, the Commission for Teaching Preparation and Licensing, and the Joint Commission on Accreditation of Hospitals. Students interested in reviewing the accreditation documents may do so by scheduling an appointment with the Office of Vice Chancellor—Academic Affairs, Mrak Hall.

## UCD's History

The Davis campus grew out of legislation passed in 1905 establishing a "University Farm" where young men and women could combine the scientific whys with technical hows in agriculture. The land for the campus was purchased in 1906, and the first students came to Davis in 1908, some for limited course work and some from UC Berkeley for practical training in agriculture.

The demand for greater educational opportunities in the state increased rapidly and in 1922, in conjunction with the UC Berkeley College of Agriculture, the degree of Bachelor of Science in Agriculture was granted those who completed the Davis program. A few years later, the Davis campus had its own College of Agriculture and, in 1948, the School of Veterinary Medicine (still the only one in the state) was established.

The campus's most rapid expansion began in 1951 when the College of Letters and Science was founded and more varied degree programs became available. In 1959, The Regents declared Davis a general campus of the University. By 1961, graduate programs were so numerous that a Graduate Division was established as a separate administrative unit. The College of Engineering came into existence the following year, owing much to the foundation already provided by the curriculum in agricultural engineering. The School of Law held its first classes in the fall of 1966, and the School of Medicine admitted its first students in the fall of 1968. The Graduate School of Management began holding classes in the fall of 1981.

The quality of undergraduate instruction is a prime concern of the faculty, students, and administration at Davis. Creative teaching and academic innovation are encouraged by several programs, including the Distinguished Teaching Awards (for which students can nominate outstanding faculty members), a \$25,000 prize for undergraduate teaching and scholarly achievement (believed to be among the largest of its kind in the nation), instructional improvement funds (for improving the quality of undergraduate teaching), the Teaching Resources Center programs which aid faculty members and teaching assistants in sharpening their teaching skills, and the Learning Skills Center programs which assist in the preparation of materials for use in classrooms and in self-paced learning activities. *Student Viewpoint*, a student-written and published evaluation of classes and instructors, is compiled each year from course questionnaires completed by students.

UCD has long been known for teaching and research in agricultural sciences. The reputation of the Davis campus in many other fields has advanced as Davis has moved into the ranks of the top 20 general research universities in the United States.

## The Setting

The Davis campus lies adjacent to the city of Davis (population 44,250), 15 miles west of Sacramento and 72 miles northeast of San Francisco. Sacramento, with all its resources as the state capital, is only 20 minutes away, yet Davis is surrounded on all sides by open space—including some of the most valuable agricultural land in the state. The total campus comprises approximately 3,600 acres. About 980 acres are devoted to the central campus, the remainder being used for agricultural research and for such special facilities as the Veterinary Medical Teaching Hospital, the California Primate Research Center, and the University Airport. (The University of California, Davis, Medical Center is located in Sacramento.)

Its location makes Davis ideal for access to outdoor recreation. Within a 70-mile radius are Lake Berryessa, Folsom Lake, Clear Lake, the famed Napa Valley, and the historic Mother Lode country. San Francisco is a little more than an hour's-drive from Davis along Interstate Highway 80. The coastal areas of Mendocino and Santa Cruz are about 150 miles from Davis, as are Lake Tahoe and the ski areas of the Sierra Nevada.

Winters in Davis are mild, with the temperatures usually above freezing. It rarely snows in the winter, but you should get good use from your raingear. Average winter temperatures range from 36 degrees to 54 degrees. Summers are sunny, hot, and dry. Although some days the thermometer may exceed 100 degrees, the overnight temperatures can drop into the fifties. Davis weather in the spring and fall is among the most pleasant in the state.

Davis is very much a bicycling town. Approximately 46 miles of bike paths and 40,000 bicycles have given Davis the title "City of Bicycles." One study found that bicycles are used for 25 percent of all travel in Davis.

The central UCD campus is closed to motor vehicles and automobile parking lots are located on its perime-

ter. Special parking places are reserved for disabled drivers (those with special disability license plates) and ramps at most buildings provide easy access for wheelchairs. Sidewalks have inclines to street level at intersections.

The Yolo Bus linking Davis with the nearby cities of Woodland and Sacramento is supplemented by Uni-trans, seven bus lines operated by the Associated Students. A Greyhound bus terminal and Amtrak station are also located in town, and the Sacramento Metropolitan Airport is a 20-minute drive from Davis.

## Campus Life

The Davis campus has always been especially noted for its friendliness and informality. To many people, Davis brings to mind Picnic Day (the annual campus open house in April) and the almost universal use of bicycles within the community. Since the Davis campus is a residential community and was originally small and isolated, a tradition of close relations between students and faculty has developed. Even though the campus has now grown to more than 22,500 students, its style remains friendly, informal, and personal. As the campus moves into the nineties, a special effort is being made to reflect the diversity of the general population by attracting more ethnic minorities, students with disabilities, and other under-represented groups. The campus' commitment to a diverse community of faculty, staff, and students, and to the preservation of an environment characterized by mutual respect and understanding are reflected in the "Principles of Community" (see the following page).

Beneath the casual and informal outlook of Davis students, however, there is an underlying seriousness and an emphasis on academic excellence. Davis students do study hard. However, those who think of Davis as just a place to study will be surprised by the variety of activities happening every day on campus. There is rarely a night without at least one movie, a day without a long list of public lectures, or a weekend without a play, concert, or special event.

## The City of Davis

The year 1868 marked not only the Act of the Legislature chartering the University of California but also the completion of the California Pacific Rail Road line from Vallejo to a junction located on the former Jerome C. Davis farm and the founding of the city of "Davisville."

The community is closely tied to the University (more than half of the people in Davis are University students, faculty members, or staff) yet the city has developed its own recreational, cultural, and community outlets to supplement the University's offerings. The Davis Art Center, adult education programs, Davis Comic Opera Company, Davis Musical Theatre Company, community theater, local galleries, recreation and parks programs, and civic organizations have strong local support. The Veterans Memorial Center complex is a focus of community events and has facilities for concerts and theater performances, exhibits, meetings, and special events.

Since its early years, Davis has recognized the importance of open space. It now operates 18 large and

grassy city parks, many with tennis courts, playgrounds, swimming pools, and playing fields, as well as a municipal golf course.

The city of Davis is changing. It still retains many characteristics of the small college town it once was, but the growth of the University has brought a corresponding development within the community. Despite the pressures of growth, people in Davis are actively concerned with maintaining the quality of life here. The small-town flavor is being preserved in the downtown core area—the city's central business district—and action by the citizens and City Council have emphasized that concern with the quality of life means a commitment to planned, environmentally sound development and limited growth.

Davis is possibly the most energy-conscious city in the U.S. Since 1973, average residential electrical consumption has dropped by 20 percent, while natural gas consumption has been reduced more than 40 percent. A series of energy-savings ordinances passed since 1968 regulates such things as new home insulation and window area and requires all new housing developments to have bicycle paths.

## The Davis Campus Today

Looking around the campus you can see modern concrete and glass buildings—the newest is the four-story Shields Library expansion completed in early 1990—contrasting with the older, original wooden structures from the University Farm days. The first building on campus, University House, is still in use providing office space for the Agricultural Issues Center and the California Center for Cooperatives.

The spirit of the campus's past as the University Farm gives UCD a sense of tradition. A University is never static, always changing to meet new needs and new conditions. Looking back, we can see that the campus has developed in ways which the founders of the University Farm could never have envisioned. But looking ahead, out of an era in which the role of the University in society is being reexamined, we can predict that the Davis campus will retain its fundamental assumption that academic programs at all levels of the University—undergraduate, graduate, professional, and research—must reinforce and strengthen each other.

The root word of University, the Latin *universitas*—entirety—reflects UCD's aim to bring together learning and life, scholarship and teaching, theory and practice, and general and professional education.

## THE UNIVERSITY OF CALIFORNIA

When the first transcontinental railroad cars steamed into the western terminal in Sacramento, only 40 students—taught by 10 professors—were enrolled in the University of California. A year earlier, in 1868, Governor Henry H. Haight signed the Organic Act which provided that a "complete University" be created for the State of California. Classes began in 1869 on the campus of the College of California in Oakland. The first few buildings on the Berkeley campus were completed in 1873, and that year the University took up residence in its new home. The following June,

## PRINCIPLES OF COMMUNITY

The 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:

We 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.

We 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.

We 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.

We 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 which 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 UCD Staff Assembly, the UCDMC Staff Assembly, the Associated Students of UC Davis (ASUCD), and the Graduate Student Association.

degrees were conferred upon the University's first 12 graduates.

Today the University has nine campuses throughout California—Berkeley, Davis, Irvine, Los Angeles, Riverside, San Diego, San Francisco, Santa Barbara, and Santa Cruz. Each campus has its own distinct atmosphere, features, and character; all are recognized nationally and internationally as distinguished educational institutions. Some 150 laboratories, Extension centers, and research and field stations on campuses and in other parts of the state strengthen research and teaching while providing public service to California and the nation.

The nine campuses of the University have a current enrollment of more than 164,600 students, 90 percent of them residents of California. Almost one-quarter of the students are studying at the graduate level.

The University's reputation for excellence has attracted a distinguished faculty of scholars and scientists in all fields of scholarship. The University has 20 Nobel Laureate winners on its faculty, and the total membership from all nine campuses in the National Academy of Sciences is the largest of any college or university system in the country. In 1989, 20 scholars from within the University received fellowship grants from the John Simon Guggenheim Foundation. These fellowships are among the highest honors that scholars can receive.

Governance of the University is entrusted to a corporation called The Board of Regents. The Regents have delegated 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 have delegated authority for the organization of the University to the president. David Pierpont Gardner is president and head of the University-wide administration. Authority for the administration of each campus has been delegated to a chancellor.



## THE UNIVERSITY LIBRARY

### Information:

General Library Administration  
108 Shields Library  
916-752-6561

The General Library at UC Davis consists of five interdependent facilities: the Peter J. Shields Library, the Physical Sciences Library, the Agricultural Economics Library, the Loren D. Carlson Health Sciences Library, and the UC Davis Medical Center Library in Sacramento. Additional material is shelved in the Annex in Surge II. There are also a number of specialized departmental libraries located on the campus, and an independent Law Library located at the King Hall School of Law.

Together, the libraries contain over 2.3 million volumes and receive more than 51,000 periodical and journal titles annually. Resources in the natural and agricultural sciences are outstanding, and there are strong collections as well in the humanities, fine arts, social sciences, and engineering. In addition to the book collections, there are over 2.7 million items on microcopy, 214,000 maps, 591,000 pamphlets, and 13,000 sound recordings.

Shields Library houses the Departments of Humanities/Social Sciences, Biological/Agricultural Sciences, Government Documents, Special Collections, and Access Services, the Current Periodicals and Bio/Ag Periodicals sections, Interlibrary Loan, and the Reserve Service. The library's general administrative offices and the technical processing departments are also located there. The Shields Library was expanded in 1990 with the addition of a west wing; other areas of this facility will be under renovation until the summer of 1991.

Shields Library is an official depository for federal and state publications, and the Government Documents Department provides services that make it easier to use these materials. Current issues of more than 7,000 journal and newspaper titles are housed in the two periodicals areas and are available for in-library use only. The Reserve Service makes short-term loans of items which are heavily used for class assignments. Special Collections houses rare books, manuscripts, photographs, and pamphlets that support research in the arts and humanities. Notable subject strengths include nineteenth-century British literature, American avant-garde poetry, the performing arts, the history of agriculture, viticulture, enology, rural life, and technology.

Special Collections also administers the University Archives, which include UC Davis theses and dissertations, and the Michael and Margaret B. Harrison Western Research Center, an 18,000-volume collection documenting the history and development of the trans-Mississippi west from the mid-nineteenth century to the present, with particular emphasis on the American Indian. Other facilities in Shields Library include a browsing collection for recreational reading, the map and microcopy collections, audio-visual equipment, and copy machines at various locations.

The collections of the Physical Sciences Library consist of over 242,000 volumes, and support teaching and research in engineering, computer science, physical sciences, and mathematics. The library maintains

a collection of approximately one million research reports of the U.S. Department of Energy, the National Aeronautics and Space Administration, the Nuclear Regulatory Commission, and other governmental agencies. A collection of approximately 10,000 geological maps is also housed here.

The Carlson Health Sciences Library serves the Schools of Medicine and Veterinary Medicine with a collection of approximately 220,000 volumes. The library at the UC Davis Medical Center in Sacramento provides a clinical collection of 23,000 volumes. The Agricultural Economics Library holds more than 7,300 volumes and 243,000 pamphlets in this field.

Compact disk databases of references to periodical articles in a number of fields are available in the Departments of Biological/Agricultural Sciences, Humanities/Social Sciences, and Government Documents of Shields Library, and in the Physical Sciences, Carlson Health Sciences and UC Davis Medical Center Libraries for use without charge. These libraries also offer a fee-based service which connects local terminals to computerized databases that provide information and bibliographies from periodical literature and other publications of the last 20 years, often including abstracts, in almost all subject areas. Numeric and directory information is also available. Most databases also provide selective dissemination of information (SDI) to help researchers regularly update their personal bibliographic files.

The MELVYL online catalog contains the bibliographic records of the entire collections of the Physical Sciences, the Carlson Health Sciences, and the Law Libraries, and of most books and periodicals held in Shields Library and on the other eight campuses of the University of California. The online catalog also contains the latest five years of records of MEDLINE, the standard periodical index for health sciences, and the latest year of citations in all sections of CURRENT CONTENTS. Other periodical indexes are being evaluated for addition to the online catalog.

The libraries provide orientation and assistance in using the various collections, most of which are available on an open-stack basis. Audiotape walking tours and lectures on the resources of the libraries are part of the Educational Services Program. Three courses for credit are offered: "Introduction to Library Research" (English 28), "Library Research Methods and Resources in the Biological and Agricultural Sciences" (Entomology 298), and "Biomedical Information Resources and Retrieval" (Epidemiology and Preventive Medicine 401).

Specialized equipment to facilitate library use by disabled patrons is available in most libraries on campus. Telephones designed to communicate with hearing-impaired persons are available in Shields, the Physical Sciences, and Carlson Health Sciences Libraries. A Kurzweil reading machine, which converts printed text to spoken form, is located in the Reserve Service in Shields Library; additional equipment for vision-impaired users is available in the other libraries. The libraries cooperate with the Disability Resource Center in providing this equipment. Users requiring other accommodations because of disabilities are encouraged to inquire at any reference desk; the

libraries are committed to a policy of service to all users.

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Interlibrary loan services allow borrowers to obtain materials from libraries throughout the University of California system and from all over the world. Some less-used library materials are located in the Northern Regional Library Facility, operated by the four UC campuses in northern California. All volumes are accessible within 48 hours by leaving a request at the circulation desk in Shields Library.

Daily inter-campus bus service between Davis and Berkeley is available to facilitate library research and other scholarly activities. Information about reservations and cost for these buses is available in departmental offices or from the central garage.

## **RESEARCH AND SERVICE ACTIVITIES**

The following facilities are connected with the Davis campus. Some are designed for the purpose of research, some for research and teaching, others to provide services to Davis students, faculty, or the surrounding community.

### **The University Arboretum**

Arboretum Headquarters  
TB 32  
916-752-2498

The University Arboretum occupies an area of about 150 acres and provides a living collection of plants along Putah Creek's historic north fork for teaching and research. The plants are attractive dry-land trees and shrubs. The acreage includes demonstration gardens, paths, campus art, and picnic tables for recreation.

Outstanding plant collections are represented by the oaks in the Shields Grove, the California native trees and shrubs (in the Mary Wattis Brown Garden), and the T. Elliot Weier Redwood Grove. Other collections of great horticultural and botanical interest include plantings of acacia, ceanothus, eucalyptus, hakea, and exotic conifers, as well as various groups in the heath family (*Ericaceae*), legume family (*Leguminosae*), and myrtle family (*Myrtaceae*). Two gardens of herbaceous perennials are next to Shields Grove: the Carolee Shields White Flower Garden and the Ruth Risdon Storer Garden of hardy plants.

The Arboretum program of seed exchange is international in reputation and has provided the University with numerous exotic plant specimens and also serves to distribute California native plants throughout the world.

Also, the Arboretum administers the Putah Creek Campus Reserve, about 150 acres of riverine woodland and wildlife along some three miles of the constantly flowing south fork of Putah Creek. This area is used for research and education.

Work-learn internships and work study for Davis students are available through the Arboretum in botany, horticulture, landscape architecture, and environmental education.

## Agricultural History Center

378 Voorhies Hall  
916-752-1827

The Center coordinates and administers several research and publication programs designed to further the study of agricultural history. Primary research activities include studies of comparative farm policy, the history of farm land values, the causes and consequences of agricultural mechanization and other sources of productivity improvements in the nineteenth and twentieth centuries, and the impact of scientific research.

The Center was founded in 1964 and edits both the *Journal of Economic History* and *Agricultural History*, the journal of the Agricultural History Society. The Center also oversees a program that publishes bibliographies on American agricultural history.

## Bodega Marine Laboratory

P.O. Box 247  
Bodega Bay, CA 94923  
(707) 875-2211

The Bodega Marine Laboratory is an organized research unit dedicated to research and teaching in marine biology and related fields. Research areas include biochemistry, physiology, genetics, microbiology, ecology, aquaculture, and fisheries. A variety of undergraduate courses are taught during the academic year and summer session. Student housing is available. The Laboratory is located in Bodega Bay, Sonoma County, 100 miles west of Davis. The Laboratory is surrounded by 362 acres of varied habitats which comprise the Bodega Marine Reserve.

## California Primate Research Center

Primate Center  
916-752-0447

The research staff of the California Primate Research Center (CPRC) investigates selected human health problems for which the nonhuman primate is the animal model of choice. Research programs include behavioral biology, developmental and reproductive biology, respiratory diseases, virology and immunology, and a variety of biomedical collaborative research projects. A major theme of the CPRC is the study of environmental influences on nonhuman primates and identification of spontaneously occurring disorders. Primate medicine and primate pathology teams are responsible for the health of the colony.

The Center, established in 1962, is supported by a grant from the National Institutes of Health. Many of the projects occurring at the center are funded by grants and contracts from a wide variety of extramural sources.

The facilities and training programs of the Center are currently being used by 34 core and collaborative faculty members, over 50 affiliate scientists, more than 50 undergraduate and graduate students, and visiting scientists.

## The Campus Writing Center

TB 116  
916-752-8024/3788

The Campus Writing Center is a campuswide program designed to provide writing instruction across

the curriculum and to assist faculty and teaching assistants with the writing component of General Education courses. Its primary means of accomplishing this goal are through

- Adjunct writing courses, and
- Writing workshops.

Adjunct writing course sections (English 102) are paired with specified courses in other disciplines. Because the reading and writing assignments in the adjunct courses are determined by the subject matter of the paired course, the adjunct courses offer students an opportunity to improve their writing skills while mastering the content of a specific discipline. In addition, English 102 courses, which carry three units of credit, fulfill the upper division composition requirement in the College of Letters and Science or partially fulfill the written and oral expression requirement in the College of Agricultural and Environmental Sciences.

The writing workshops are available upon request by faculty members or teaching assistants. The workshops focus on specific aspects of academic writing and are adapted to meet the needs of any field. In particular, workshops are designed to offer training and help to professors or teaching assistants in General Education courses who have responsibility for assigning, correcting, and evaluating student papers. Workshops are also conducted (upon the request of faculty members) for undergraduate students writing essay examinations or term papers.

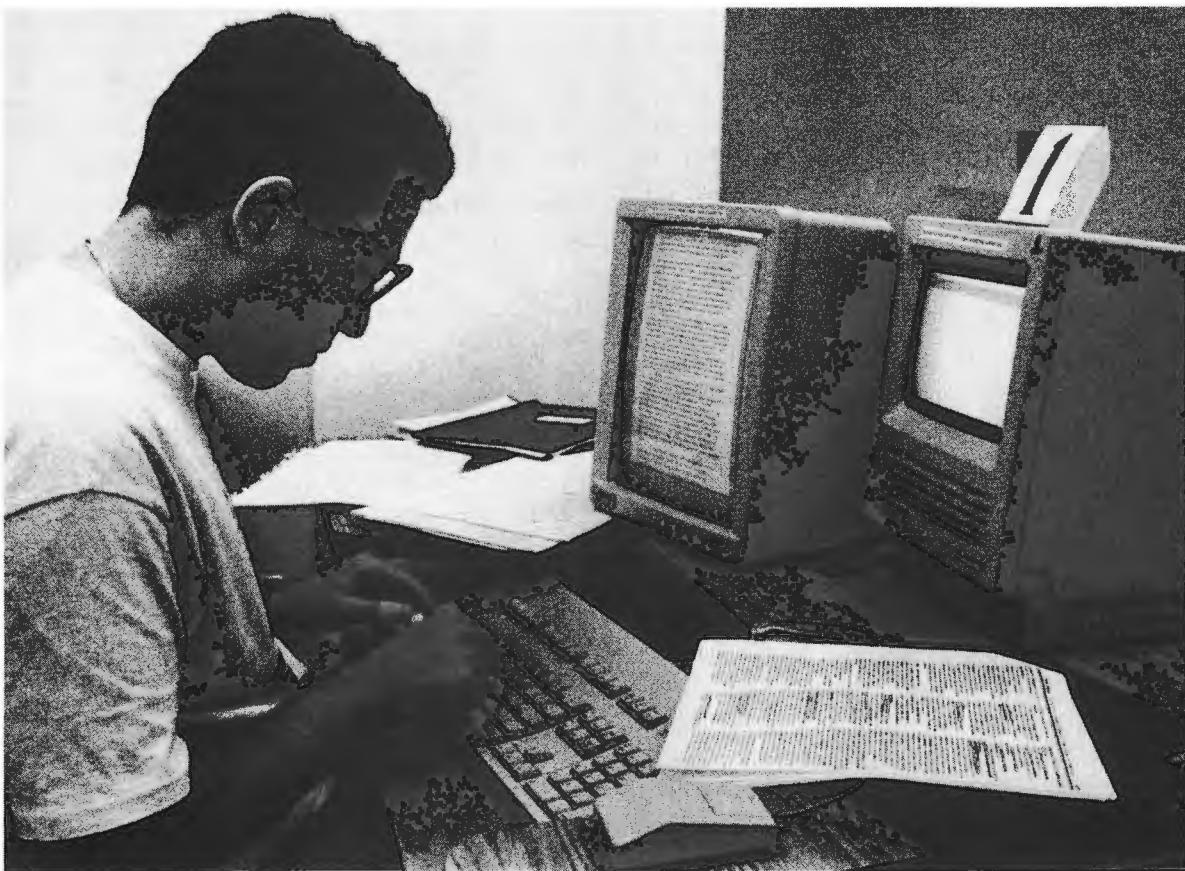
The Campus Writing Center is affiliated with both the Office of the Vice Chancellor, Academic Affairs, and with the English Department.

## Computing Services

Surge II  
916-752-0233

Computing Services, with main offices at Surge II, serves the campus for batch, interactive timesharing, and remote job entry mainframe computing. Additionally, numerous microcomputers and scientific workstations are provided for student use. The department's primary concern is service to students and, therefore, instructional usage on the academic computer systems has priority over research and administrative users. Davis has developed an innovative Easy Access system of computing for student use. Any student on campus, upon presentation of a valid registration ID card at the Dispatch Counter in the basement of Hutchison Hall, may open an Easy Access account. A specified sum is allotted to each student from instructional funds, and, within general confines, the student may use the funds to purchase computer time for any project. Regularly scheduled computer-related and individual study courses are funded separately. Microcomputer labs are also provided at no direct charge to students.

Computers operated by Computing Services include: a Unisys A10FX, the primary administrative computer; a Unisys A6KX for administrative development work and A10FX backup; and three DEC VAX 11/785s and two VAX 8600s for academic use. Two additional VAX 11/785s are used to manage network activities. These systems support over 100 terminals located in four



student terminal rooms, plus over 3,000 additional terminals and microcomputers located throughout the campus. One of the terminal classrooms is designed primarily for teaching interactive graphics and is equipped with twenty-four color graphics terminals and six ink-jet color graphics copiers. During open hours these classrooms can be used by students any time that class instruction is not scheduled. Consultants are available to answer questions. Additionally, there are ten microcomputer labs with a combination of over 240 IBM PC compatible, IBM PS/2, and Macintosh microcomputers. There is also a 28 station SUN 3/50 scientific workstation laboratory.

The computer systems are accessed through the Develnet, a switching computer which allows the user to identify from an individual terminal the computer system required for the work which is to be accomplished. Computing Services also manages a Data Entry Group for key-to-disk entry of data into the computer systems.

### **Center for Consumer Research**

148 Everson Hall  
916-752-2647

The Center is a small research unit devoted to consumer issues. Major areas of interest include product and service quality, consumer information and education, consumer decision behavior, and institutions and public policy as they relate to consumer issues. Activities of the Center include support of consumer projects undertaken by faculty, graduate students, and Extension specialists, and a newsletter, in addition to a core research program. The Center also houses a library containing books and periodicals on consumer-related topics.

The Consumer Research Center began operation in 1977 and has been supported since that time by the College of Agricultural and Environmental Sciences and outside grants.

### **Adult Fitness Program**

Department of Physical Education  
916-752-2540

The Adult Fitness Program is open to people from the University, the city of Davis, and surrounding communities. It provides members with a comprehensive physical fitness evaluation and an individualized exercise program for improving cardiovascular endurance and fitness. The program is sponsored by the Department of Physical Education with considerable support from the Division of Cardiovascular Medicine, School of Medicine. Membership is unrestricted and participants may begin the program at any time during the year.

Emphasis is placed on the evaluation of cardiovascular fitness and health and on the assessment of body fat by underwater weighing. Participants receive blood chemistry analysis, nutrition analysis and counseling, resting 12-lead electrocardiogram (ECG), exercise stress test with ECG, pulmonary function tests, body composition analysis, strength and flexibility tests. They also receive individual counseling for exercise training, weight control, and preventive medicine in general. Supervised exercise sessions include walking, jogging, swimming, and cycling. A cardiac rehabilitation program is offered to patients with heart disease and to individuals who have a high risk for developing heart disease.

Special activities of the Adult Fitness Program are offered to University students and employees. These

low-cost activities give participants an opportunity to have their body type and fatness determined, with personal counseling on how to achieve a desired body weight through proper nutrition and exercise. A "Shape-Up" program for students and staff is open at the beginning of each quarter and includes submaximal exercise testing, body composition analysis, and supervised exercise sessions.

### **Early Childhood Laboratory**

TB 117  
916-752-2888

The Early Childhood Laboratory (ECL) is sponsored by the Human Development and Family Studies unit in the Department of Applied Behavioral Sciences to provide a facility where students enrolled in Human Development courses can develop observational techniques and participate with peers, children, parents, and professionals in an early childhood program. The faculty help students link theory and practice, develop a recognition and respect for individual differences, and consider their interaction and communication styles. Selected graduate students and faculty also conduct research at the Laboratory.

Four Laboratory programs accommodate children from ages six months to five years for three hours a day, following the academic calendar. Tuition is lower for UCD student families than for UCD staff, faculty, and community based families. A county program for children with special needs is housed at the ECL facility, and children and staff are fully integrated. Information about the ECL and enrollment procedures can be obtained by telephoning 916-752-2888 between 8:30 a.m. and 4:30 p.m. or writing to ECL, Department of Applied Behavioral Sciences.

### **Veterinary Medicine Teaching and Research Center (VMTRC)**

18830 Road 112  
Tulare, California 93274  
(209) 688-1731

The facilities of the VMTRC at Tulare were occupied in January, 1983. Located in a region of the state that has concentrated, diversified livestock production enterprises, the Center has developed programs with livestock production units to serve as a principal clinical center of UCD's School of Veterinary Medicine for teaching, research, and service programs on food-animal herd health, preventive medicine, and production management.

### **Water Resources Center**

University Extension Building  
916-757-8901

The Water Resources Center is a Universitywide organized research unit charged with coordinating water resources research on the UC campuses. Through University research funds and funds from the U.S. Department of the Interior, the Center supports selected research in such areas as agricultural sciences, biological sciences, economics, engineering, history, geography, law, meteorology, physical sciences, and political science.

Research interests include water resource systems engineering, economic evaluation of water develop-

ment and conservation, political strategy in water resource development, environmental and energy relationships in water resource management, watershed hydrology, ground water use, soil and land use management in relation to water resource use, and maintenance and improvement of water quality.

### **Facility for Advanced Instrumentation**

9 Hutchison Hall  
916-752-0284

The Facility for Advanced Instrumentation supports research and instructional programs in electron microscopy, mass spectrometry, and morphometrics. The electron microscope laboratory houses scanning and transmission electron microscopes adjacent to a specimen preparation laboratory. Instruction in the theory and operation of the electron microscopes is provided by a unique autotutorial system and hands-on sessions with the microscopes. Morphometric analysis is supported by a computerized digitizing tablet and a digitizing video image analysis computer. The mass spectrometer laboratory consists of a quadrupole mass spectrometer and a high resolution double-focusing instrument. Both mass spectrometers have soft ionization and high mass capabilities and are interfaced to gas chromatographs and data acquisition systems. Instruction in the theory and operation of the mass spectrometers is offered throughout the year. Facility staff are available to teach students to use facility instruments, consult with users regarding experimental design, prepare samples and specimens for analysis, and operate the facility's instruments.

The Facility also promotes and coordinates the shared use of major scientific equipment located in various campus departments, including electron microscopes, an electron microprobe, an x-ray fluorescence spectrometer, an x-ray diffractometer, a paleomagnetometer, a scintillation counter, a cesium irradiator, and a whole body counter.

### **Institute of Ecology**

2132 Wickson Hall  
916-752-3026

The Institute of Ecology was established in 1966 as an organized research unit. The Institute fosters ecological and environmental research, provides intellectual leadership in ecology, administers resources and facilities, provides information on extramural support of ecological research, and maintains liaison with governmental and private organizations interested in funding ecological and environmental research, or requiring advice on these subjects.

The Ecology Institute has a publication series and sponsors national and international activities, including organizing symposia and conferences. The Institute has management responsibility for the Jepson Prairie, Putah Creek, and Stebbins Cold Canyon reserves that are part of the UC Natural Land and Water Reserves System. The Institute's Cooperative Resources Studies Unit, supported by an agreement with the National Park Service, sponsors and administers research in the national parks of California.

More than one hundred faculty members plus graduate and undergraduate students from all the schools

and colleges on the Davis campus are involved in the Institute's activities.

### **Institute of Governmental Affairs**

Third Floor, Shields Library  
916-752-2042

The Institute of Governmental Affairs (IGA) serves as a center for advanced social science research. IGA offers research opportunities for faculty, undergraduate, and graduate students, as well as for visiting scholars from throughout the United States and around the world. The Institute now sponsors ten research programs: Applied Macroeconomics; Rural Human Resources; East Asian Business and Development; Government and Politics; Applied Public Policy; International Conflict and Cooperation; Productivity and Quality Control; Pacific Rim Studies; Economy, Justice and Society; and Regulation and Deregulation in the American Economy. The Institute also supports a wide range of public affairs programs, seminars, and conferences, provides specialized library services, and oversees the Social Science Data Service.

### **Institute of Marine Resources**

TB 186  
916-752-2506

This statewide institute was organized in 1955 with headquarters at La Jolla. The marine food science component of the organization was located on the Berkeley campus, but in July 1970 it was transferred and became part of the Department of Food Science and Technology at Davis. The staff studies factors affecting the chemical, biochemical, microbiological, and nutritional properties of fish and other seafoods. Current studies include those dealing with comparative biochemistry of proteolytic enzymes, the use of modified atmospheres for storage of seafood products, crustacea nutrition, carotenoprotein extraction as part of a project dealing with shellfish waste, and extracellular enzyme processing and production by a hydrocarbon-utilizing yeast.

### **Intercampus Institute for Research at Particle Accelerators**

Professor Richard L. Lander, Associate Director  
325 Physics/Geology Building  
916-752-1780

This Universitywide institute, established in 1977, conducts research that uses the unique facilities at national and international accelerator laboratories, particularly the Stanford Linear Accelerator Center, the Enrico Fermi National Accelerator Laboratory, the Japanese accelerator laboratory (KEK), and the German laboratory (DESY) in Hamburg. High-energy particle physics is the dominant area of research, both theoretical and experimental. The Institute also promotes seminars and lectures by visiting researchers at individual campuses.

### **Crocker Nuclear Laboratory**

Crocker Nuclear Laboratory  
916-752-1460

This facility was established by the University in 1965 as an interdepartmental laboratory for the application of nuclear science to a variety of disciplines. The Laboratory has research programs in nuclear physics and

chemistry, air pollution analysis, activation analysis, biology, neutron damage studies, the effect of background radiation on computers, and historical studies. Isotopes produced by the variable-energy 76-inch cyclotron are used in clinical and research applications, including pioneering work in brain imaging. Teaching activities at the undergraduate, graduate, and postdoctoral levels are in biology, medicine, radiochemistry, and physics.

### **Institute of Toxicology and Environmental Health (ITEH)**

Institute of Toxicology and Environmental Health  
916-752-1340

The Institute of Toxicology and Environmental Health (formerly the Institute for Environmental Health Research) coordinates interdisciplinary research concerned with biomedical and toxicological problems related to exposure to chemical, physical, and biological toxic agents or to ionizing radiation. The overall aim of the research at the institute is to determine basic mechanisms of toxic effects and to predict human health hazards from continual exposure to realistic levels of toxic substances in the environment or at the workplace. Studies on toxic, radioactive, mutagenic, carcinogenic, and teratogenic compounds are carried out in special animal holding facilities. Central laboratories exist for analytical chemistry, radiochemistry, ionizing radiation detection and quantification, cell biology research, inhalation toxicology, and human epidemiology. The Institute houses major Universitywide programs in Toxic Substances and Occupational Health.



## Serology Laboratory

Horse Bloodtyping Laboratory  
 Armstrong Tract  
 916-752-2211  
 Cattle Bloodtyping Laboratory  
 Armstrong Tract  
 916-752-7383

The Serology Laboratory was established in 1955 to provide blood-typing services for the animal breeding industry. The Laboratory is a self-supporting unit of the School of Veterinary Medicine; its facilities are available to students working towards M.S. and Ph.D. degrees in genetics, immunology, and comparative pathology.

The Laboratory is recognized for its pioneering research on animal blood groups and biochemical polymorphisms. Current research activities of the Serology Laboratory include: investigation of red cell, serum, lymphocyte and DNA genetic markers which enhance the effectiveness of current techniques applied to parentage investigation and identification of cattle, horses, sheep, goats, llamas, and dogs; study of breed relationships through gene frequency analysis; application of blood typing tests to clinical veterinary medicine; investigation of the major histocompatibility complex (MHC) of cattle and horses and its role in resistance or susceptibility to a variety of diseases; study of the role of chromosome abnormalities in infertility; and investigation of the mode of inheritance of several suspected hereditary diseases.

The Laboratory works closely with the Equine Research Laboratory and the Livestock Diseases Research Laboratory, as well as with other departments, such as Animal Science.

## Natural Reserve System

Information:  
 Natural Reserve System  
 300 Lakeside Drive, 6th Floor  
 Oakland, CA 94612-3560  
 (415) 987-0150

The University of California administers some 30 natural reserves throughout the state. These reserves comprise a representative cross-section of California's diverse ecosystems and include deserts, off-shore islands, mountains, and even submarine canyons. Unlike parks or wilderness areas, the reserves are devoted entirely to teaching and research purposes and are not available for recreation. Since 1965, when the program was initiated, the University, using non-state funds, has acquired these carefully selected sites which might otherwise have become unavailable for scientific study. UC Davis administers three Natural Reserve System reserves and one affiliated field site.

### Bodega Marine Reserve

Peter G. Connors, Ph.D., Reserve Manager  
 P.O. Box 247  
 Bodega Bay, CA 94923  
 (707) 875-2020 or (707) 875-2211

Bodega Marine Reserve comprises 362 acres of coastal habitats near Bodega Bay in western Sonoma County, approximately 100 miles from the Davis campus. This site includes a remarkably diverse set of habitats, including an excellent rocky intertidal zone,

sand beaches, saltmarsh, lagoon tidal flats, freshwater marsh, coastal prairie, and dunes. Adjacent subtidal sand and rock habitats in a Marine Life Refuge are administered as part of the Reserve.

The attractiveness of this site for research and teaching is enhanced by the excellent on-site facilities of the Bodega Marine Laboratory. This modern, well-equipped laboratory consists of several buildings, with over 60 research and support staff. On-site housing is available for students and visiting researchers. More than 30 field research projects are currently active at Bodega Marine Reserve, making this one of the most productive reserves in the Natural Reserve System.

### Jepson Prairie Reserve

Institute of Ecology  
 2126 Wickson Hall  
 UC Davis  
 916-752-6580

The Jepson Prairie Reserve is located fifteen miles south of the campus and comprises 1,566 acres of perennial bunchgrass grassland and vernal pools. The Jepson Prairie area is typical of habitats which once covered most of California's Central Valley and is recognized as the best remnant of native prairie land. Several rare or endangered species are endemic to the area. Long-term grazing and fire ecology research to aid in management of native grasslands began in fall 1986.

### Stebbins Cold Canyon Reserve

Wesley W. Weathers, Ph.D.  
 Department of Avian Sciences  
 3202 Meyer Hall  
 UC Davis  
 916-752-1300

In 1979, the University purchased 277 acres of wildland in Cold Canyon as part of its Natural Reserve System. It is located twenty-four miles west of campus near Lake Berryessa. In 1984, 299 acres were added to the Reserve, which is named in honor of G. Ledyard Stebbins, professor emeritus of genetics. The Davis campus has administrative and management responsibility for the reserve, which will be maintained in its present natural state. The reserve is available for teaching and field research by scientists and students from all campuses of the University and researchers from other institutions of higher learning.

Terrain and rainfall patterns of the Cold Canyon area support examples of several different plant communities found in both the inner and outer coast ranges. The diversity of plant and animal species on the reserve, and its close proximity to the campus, contribute to the popularity of the reserve as an open-air classroom and research site.

### Putah Creek Campus Reserve

Kerry Dawson  
 Environmental Design  
 UC Davis  
 916-752-2498

The University Arboretum administers a campus nature reserve known as the Putah Creek Campus Reserve. Putah Creek and its south fork flow along the southern boundary of the campus with the reserve



consisting of a 150-acre corridor along the north bank approximately 6 kilometers long and averaging 100 meters wide. Vegetation and wildlife include native and introduced species. The goals of the reserve are habitat conservation, education, research, and environmentally-directed recreation.

### **Sustainable Agriculture Program: Student Experimental Farm**

Information:  
College of Agricultural and Environmental Sciences  
916-752-7645

The Student Experimental Farm is an innovative teaching and research facility located on twenty-five acres of University land, and is the main focus of the Sustainable Agriculture Program. Since its inception in 1977, the Student Experimental Farm has provided students with unique opportunities to explore alternative agricultural technologies and philosophies through classes, special projects, internships, work study jobs, and original research.

The farm offers students numerous opportunities to gain practical experience in areas such as organic crop production, aquaculture, small animal husbandry, farm operations, and seed saving. In addition, classes such as "Alternatives in Agriculture" and "Introduction to Sustainable Agricultural Systems" provide students with a chance to examine various agricultural issues in the classroom.

Because the farm includes several acres of land that have been managed organically for over a decade, it provides researchers with a facility for conducting field research into sustainable agriculture. Whether interest is in organic or other farming systems, the farm can provide several services to facilitate student research projects.

### **Carnegie Institution of Washington, Department of Embryology, Davis Division**

916-752-0210

The world-renowned Carnegie Embryological Collection, founded in Baltimore in 1914 by Franklin P. Mall, and the later collections of Hertig, Rock, Hartman, and Bluntschli, are now housed at UCD. The collection includes insectivore, prosimian, platyrhine, and catarrhine embryos.

The resources of this department are available to qualified investigators on a very limited basis, on application to the director.

### **ADDITIONAL ACADEMIC RESOURCES**

### **UNIVERSITY EXTENSION**

Information and catalogs:  
1333 Research Park Drive  
916-757-8777

The free quarterly University Extension catalog contains the current list of continuing education programs offered in Sacramento and Davis. Enrollment is open to the general public. No formal admission to student status is required to take advantage of the wide variety of stimulating programs.

Fields covered by University Extension courses include agriculture, business and management, computer studies, education, engineering, environmental studies, graphic design, health and human services, labor relations, liberal arts, personal financial planning, hazardous materials management, wilderness recreation, international travel study, and winemaking.

Programs vary in length and format, from one-day

conferences and short lecture series to certificate programs requiring attendance for several quarters. Classes are held both on and off campus. Instructors are drawn from the University and nearby college faculties, professionals in the field, and internationally known experts.

Enrollment fees enable University Extension to function as a financially self-supporting nonprofit organization.

## ARTS AND LECTURES

Information:  
104 Freeborn Hall  
916-752-2523

UC Davis Arts and Lectures presents a wide variety of performing arts events for the student and campus community and audiences throughout the greater Sacramento region. During the academic year, Arts and Lectures presents concerts and recitals by classical, jazz, and folk music artists; drama; classical, modern and ethnic dance; and lectures by eminent public figures.

Supported in part by student fees, Arts and Lectures provides UCD students with ticket prices of up to 50 percent off for all performances. Student volunteers usher at many performances and help with promotional activities; student employees work as drivers, office assistants and stagehands. Students also serve on the Committee for Arts and Lectures, the Chancellor's Advisory Committee composed of UCD staff, faculty and students which helps to select performing arts programs. Many Arts and Lectures events at UCD include free lecture-demonstrations, noon concerts and master classes for students. Arts and Lectures also works with the Department of Music cosponsoring various performances throughout the year.

Annual and quarterly brochures and promotional materials for upcoming events are available through the Arts and Lectures office at the above location. Tickets for Arts and Lectures events may be purchased at the UCD Campus Box Office in Freeborn Hall.

## CAMPUS EVENTS AND INFORMATION OFFICE (CEIO)

Information:  
4th Floor, Memorial Union  
916-752-2813

The Campus Events and Information Office provides a range of services to clientele seeking facility reservations, conference services, and special event presentations. CEIO is responsible for interpreting and applying campus policies related to the use of campus facilities and services. The staff of CEIO assists organizations in facility reservations and coordinating various services related to events. For further information contact this office at the above location.

The Information Services unit of CEIO provides general information regarding special events, campus tours, location of facilities, parking, etc. Information stations are located at 129 Mrak Hall (916-752-0539) and the Memorial Union lobby (916-752-2222). Questions pertaining to campus tours and tour programs should be directed to 129 Mrak Hall.

## PUBLIC SERVICE RESEARCH AND DISSEMINATION PROGRAM

Information:  
101 University Services Building  
916-757-8820

The Public Service Research and Dissemination Program sponsors collaborative research efforts between



faculty and government or private agencies on public policy issues. Research and dissemination projects are solicited, reviewed and funded in the area of environment, agroecology, and global climate change. Collaborators are encouraged to assist in the research process and are involved in dissemination of findings.

Seminars, conferences and publications are used to link faculty and decision makers and to establish change in research directions.

## SUMMER SESSIONS

Information:  
44 Mrak Hall  
916-752-1647

Summertime affords students the opportunity to accelerate progress toward a degree, to tackle problem courses and meet prerequisites, to take special study courses, or to do research. Although it is possible to complete up to 24 units by attending both summer sessions, 7 units per session is an average load.

Summer sessions at Davis offers a wide variety of lower division and upper division courses that provide full University credit. Special programs are also available in Great Britain, France, Italy, China, and Chile. Admission is open to all university students, high school graduates, and other qualified applicants. However, admission to a summer session does not constitute admission to the University's regular sessions.

In 1991 there will be two six-week sessions at UC Davis: June 24 through August 2, and August 5 through September 13. For the *Summer Sessions Bulletin* and application materials (available about mid-March), write to the address above.

## WORK-LEARN INTERNSHIPS

Information:  
The Internship and Career Center  
2nd floor, South Hall  
916-752-2855

Where are you going with your life?

That question is hard to answer in today's complex world. You may need to clarify your personal or educational goals. Or expand your awareness of the "working world." Or find out if you are really interested in a career in business, research, teaching, or agriculture.

One way to make these and other important decisions is to participate in a work-learn internship. An internship expands your learning beyond the classroom and enables you to make better decisions for the future by helping you to assess your skills, explore career opportunities, and secure on-the-job experience.

You can take advantage of one of the hundreds of organized internships through the Internship and Career Center, or initiate your own. Established internships include opportunities in:

- agricultural and environmental sciences
- education and counseling
- engineering and physical sciences
- health and biological sciences

- liberal arts

An internship may be full time or part time, credit or non-credit, voluntary or involving a stipend—depending on your needs and interests and the availability of openings. Internship experiences must emphasize learning rather than routine activities, and include field supervision by a qualified professional and, where appropriate, the faculty member responsible for giving credit.

A notation describing the internship can be made on your transcript by obtaining prior approval from the Internship and Career Center. Approval for transcript notation is granted for completed internships which meet prescribed University standards as advertised by this office. Academic credit is awarded only for experiences planned and approved in advance by the sponsoring faculty member.

## UC DAVIS WASHINGTON CENTER

Prof. Bruce W. Jentleson, Director

Information:  
Donald J. Hagerty, Program Manager  
Internship and Career Center  
2nd Floor, South Hall  
916-752-7260

The UC Davis Washington Center begins operations with the 1990-91 academic year. Its central objective is to provide students and faculty new and expanded opportunities to enrich their education and research. Its principal activities are an undergraduate academic internship program and a research center for faculty and graduate students.

### Undergraduate Academic Internship Program

The Davis Washington Center undergraduate program will operate on a 12-13 week "extended quarter" basis during fall 1990 (September 15-December 16) and spring 1991 (March 30-June 22). It is open to students from all majors in the Colleges of Letters and Science, Agricultural and Environmental Sciences, and Engineering who have completed 84 units towards graduation. A 3.0 minimum grade-point average is recommended. Graduating seniors must apply for the fall quarter program.

The undergraduate program has three principal components:

- **Internships/Research Projects (6-8 units):** Students will work four days per week as interns in Congress, federal agencies, interest groups, trade associations, research institutions, the media, museums or in other organizations related to policy, politics, science and culture and geared to the interests and objectives of individual students. Drawing on the internship experience, each student will develop a research project, under the supervision of a member of the faculty.
- **Policy-Process Seminar (3-4 units):** This seminar focuses on a particular area of policy (e.g., foreign policy, science policy, economic policy, agricultural policy) and the key issues, the politics, the principal institutions, and the dynamics of the process within that policy area. In addition to regular instruction, seminars are likely to include guest speakers,

observations of congressional committees and federal agencies, and other relevant Washington experiences.

- **Topical Interest Seminar (3-4 units):** This course is of more general interest, designed to draw on some of the unique historical, scientific, cultural and artistic resources of Washington.

All courses will be taught by UC Davis faculty in residence or visiting faculty from the Washington area. Students will earn 12-16 units of academic credit, continue to be registered as full-time students, and fulfill university residency requirements.

Financial aid eligibility is maintained, and the aid package can be adjusted to reflect the additional costs of the Program. Some additional financial assistance also is available.

Students live in university-arranged housing, convenient to public transportation. Arrangements also are made to cover health services and other aspects of student life.

## EDUCATION ABROAD PROGRAM

Information:  
Education Abroad Program Office  
323 South Hall  
916-752-3014

Carolyn F. Wall, Ph.D., Campus Coordinator:  
Assistant Vice Chancellor for International Programs  
Dean's Office, College of Letters and Science  
916-752-0392

The United Kingdom, Japan, Sweden, Norway, Mexico, Brazil, Hong Kong, Costa Rica, Ireland, Egypt, France, Austria, Taiwan, New Zealand, China, Germany, Italy, Korea, Israel, Spain, Kenya, India, Peru, the USSR, Australia, Portugal, Hungary, Togo, Thailand, Denmark, Canada, Indonesia, and Ghana.

An around-the-world itinerary for madcap travelers? No. These are the places where you can study as a participant in the University's Education Abroad Program (EAP). The program continually expands; check with the EAP Office for additional locations available for study abroad.

Most EAP experiences are for undergraduates for an academic year. However, several short-term/special focus programs are offered in a variety of countries. See the "Education Abroad Program" in the Programs and Courses section of this catalog for further information.

Graduate students who have completed at least one year of graduate work at the University and have the support of their department and the Graduate Division are also eligible for some EAP programs.

The primary purpose of EAP is to provide an academic experience in a different educational system. For the most part, UC students abroad live as do students at the host university, attend the same classes, take courses from the same professors, and take part in local social and cultural activities. Full UC unit credit is given for courses satisfactorily completed.

Eligibility requirements include:

- At least three regular session quarters completed in residence at UC by the time of participation

- At least 84 quarter units completed by the time of participation, except for specific short-term programs
- At least a 3.0 grade-point average for course work completed at UC at the time of application and departure; except for Mexico SFE and Togo SFE programs where the minimum GPA requirement is 2.0
- In most cases, 2 years (6 quarters) of University-level foreign language or the equivalent, with a 3.0 grade-point average (not applicable where classes are in English), but consult EAP Office for specific requirements
- An academic plan approved by your major adviser and the campus coordinator
- Endorsement of the Academic Senate Committee on the Education Abroad Program

To help overcome "culture shock" and prepare you for your academic schedule, University of California professors administer intensive language and orientation programs at many of the overseas campus locations. Moreover, should any personal or scholastic problems arise during your study abroad, the faculty members will be there to assist you.

Estimated all-inclusive minimum costs for the nine- to twelve-month program range from \$7,000 to \$15,000 (varies depending upon the country).

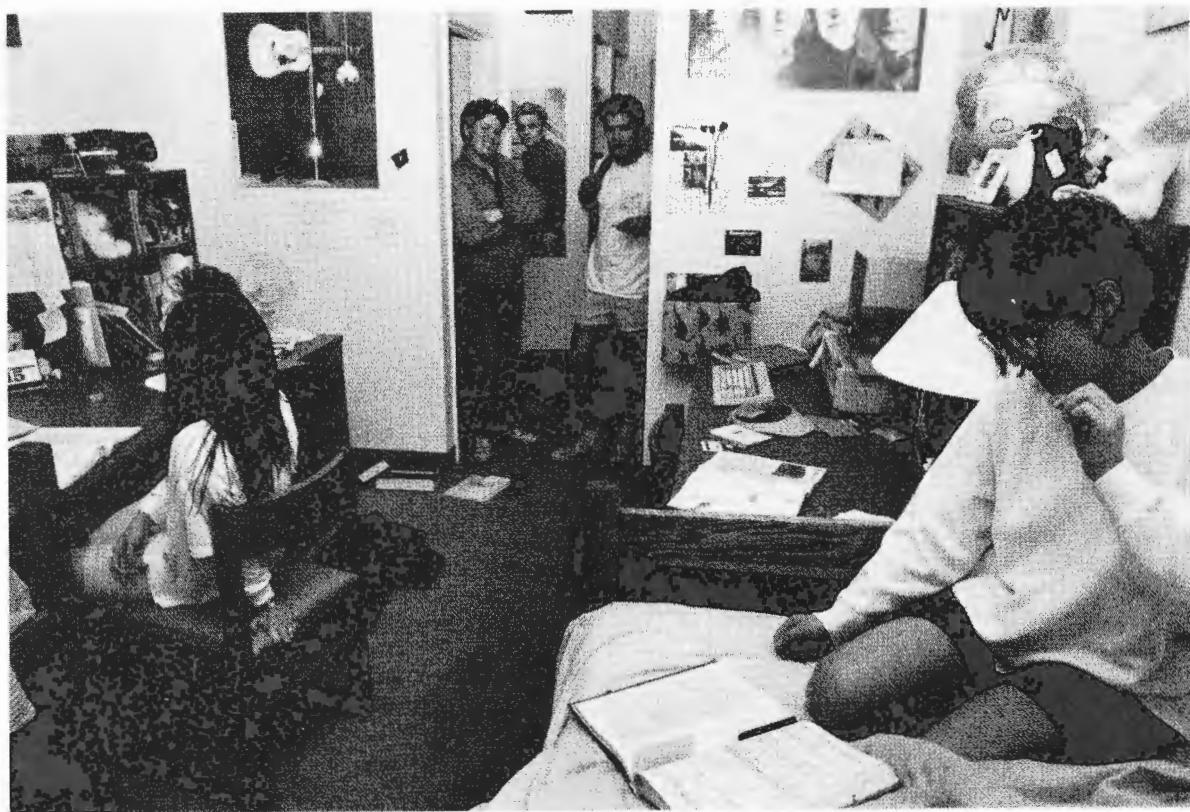
For study abroad during the 1991-92 academic year, the application deadlines are as follows: mid-October for spring semester programs in China and the USSR, and the Japan Peace Studies spring quarter program; mid-November for the United Kingdom and Ireland, Japan, and the spring quarter programs in Mexico and Costa Rica; mid-May for Australia, New Zealand, and the year program in Costa Rica; and mid-to-late January for all other study centers. If you intend to participate in a study program during your senior year, careful advance planning is necessary to make sure that all degree requirements will be met. Consult with your major adviser, the Dean's Office of your college, and the campus EAP coordinator. For information on EAP centers and study programs, refer to EAP in the Programs and Courses section of this catalog.

You can obtain informational brochures on other opportunities for study, travel, and employment abroad from the Education Abroad Program Office.

# Student Life

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## LIVING ACCOMMODATIONS

### Residence Halls

Information:  
Student Housing Office  
(916) 752-2033

You can expand your UC Davis experience and add a measure of convenience to your life by living on campus; some 4,500 undergraduates and 178 graduate students do just that. Each of the residence hall complexes is staffed with students and professionals who help create and maintain an environment conducive to personal growth and educational achievement. Over 86 percent of the freshman students live in residence halls. Twenty-five percent of the transfer students elect to live in a residence hall environment. All new undergraduates whose applications are received on or before April 1, 1991, are guaranteed residence hall housing as long as they complete all of the instructions which accompany their contracts. All graduate students whose applications are received on or before May 1, 1991, will participate in a lottery for the 178 spaces available in Lysle Leach Hall.

The total room-and-board rate for 1990-91 is \$4,655 for a double-occupancy room and \$5,110 for a single room (of which there are very few available to new residents). Nineteen meals per week are provided. Rooms are furnished to provide each resident with a bed, desk and chair, bookcase, chest of drawers, study lamp, and bulletin board.

If the Davis campus is your choice when filling out your University Admissions Application, the necessary information and applications are mailed to you by the UCD Undergraduate Admissions Office. If you have a physical disability which requires special housing accommodation, please attach a detailed letter of explanation to your application.

### Student Family Housing

Information:  
Student Family Housing Office  
Orchard Park/Solano Park  
(916) 752-4000

There are 476 furnished and unfurnished on-campus apartments for UCD student families. The monthly rates for the academic year 1989-90 were as follows:

- Orchard Park, two-bedroom unfurnished apartment, \$363.
- Orchard Park, two-bedroom furnished apartment, \$386.
- Solano Park, one-bedroom unfurnished apartment, \$267.
- Solano Park, two-bedroom unfurnished apartment, \$303.

Vacancies in Student Family Housing are filled from a chronological list based on the date of application. You should anticipate a wait of at least five months for a fall assignment (may be less at other times during the year). An application may be submitted before you are admitted to the University and before you are married, but you must show documentation of your student and marital or parental status before occupancy can be granted. If a member of your family has a physical disability which requires special housing accommodation, please attach a detailed letter of explanation to your application.

### Russell Park

Information:  
(916) 753-7322

*Privately owned and managed* on-campus living accommodations are available for student families. Russell Park features one-, two-, and three-bedroom unfurnished units. Monthly rents for academic year

1989-90 ranged from \$373 for a one-bedroom unit to \$605 for a three-bedroom unit.

## Other Graduate Student Housing

Information:  
The Atriums  
(916) 753-7322

The Atriums offer on-campus living accommodations for single graduate students. The *privately owned and managed* apartments feature studio and two-bedroom unfurnished units. For the academic year 1989-90, monthly rent for a studio was \$385 and \$528 for a two-bedroom unit.

## Community Housing

Information:  
Student Housing Office  
(916) 752-2483

If you choose to live off campus, the Community Housing Office can be a valuable resource. This office maintains vacancy listings to assist you in roommate selection and in locating rental housing off-campus. Housing available in the community includes apartments, duplexes, condominiums, mobile homes, and rooms in private homes. Listings change daily, so they are not furnished by mail nor given over the telephone.

Other services of the Community Housing Office include: counseling and mediation of landlord/tenant and roommate grievances; educational programs; publications; liaison with fraternities, sororities, city government offices, and housing-related agencies in the community; and child care information and referral. This office also provides information on accessible housing to persons with disabilities.

## THE ARTS AT DAVIS

Whether you want to participate, be entertained, or be inspired, an abundance of creative, musical, dramatic, art, design, and dance offerings are happening on campus all year long.

The Department of Music (916-752-0666) sponsors the University Symphony, Chorus, Chamber Singers, Early Music Ensemble, Concert Band, and small ensemble groups. Music majors and other interested students can receive credit for participation in these groups, which perform at concerts and recitals open to the University community. The department also sponsors an artist-in-residence for one quarter each year who gives concerts, recitals, and lectures, and who works with music classes and individual students. Free noon concerts featuring individual performers and ensembles—both professional musicians and music students—are a favorite weekly event during the school year. The UC Davis Contemporary Music Players and the UCD Faculty Woodwind Quintet are in residence on campus. The Department of Music sponsors nearly one hundred public concerts each year.

The Department of Dramatic Art has one of the best theatre facilities in California. The excellent faculty and the Granada Artists-in-Residence program (which brings a major British director to the department each quarter), the presence of graduate students working on Master of Fine Arts (MFA) degrees in acting, directing, playwriting, and design, and an unusually good

stock of scenery, props, costumes, and lighting equipment all contribute to the professional quality of Davis productions. Each year's drama schedule includes University Theatre Season (five major productions of established plays); one major special event; Premiere Season (five smaller productions of plays written by students); Studio Season (three smaller productions of established plays); and dozens of class-related projects. These productions are part of the academic program of the department and serve an important purpose in the study of dramatic art. Participation is open to all students.

A tour of all the UCD art galleries will take you from one corner of the campus to the other. The **Memorial Union Art Gallery** (916-752-2885) features a series of changing contemporary and historical art exhibits during the school year. The Gallery utilizes student employees and interns in operating the facility. Works by professional artists as well as students are on display for periods of six weeks.

The **Design Gallery** (916-752-6223) on the first floor of Walker Hall is known for its unique exhibitions of design-related material. Changing exhibitions are designed with special themes and media that reflect the interests of the design program. Presentations and installations of architecture, interiors, graphics, costumes, textiles, folk art and the annual Picnic Day Student Exhibition are some of the areas from which shows are designed. The Design Gallery is an innovative gallery where the installations are as interesting as the material presented.

The **Richard L. Nelson Gallery** (916-752-8500), named in honor of the first chairperson of the Department of Art, was dedicated in 1976. Located on the first floor of the Art Building, the Gallery organizes regularly changing exhibitions of historical and contemporary works of art. The Gallery's program of high quality and rich variety reflects and complements the teaching program of the Department of Art and provides aesthetic enrichment to the University community and the Northern California area at large. The **Fine Arts Collection** (916-752-8500) is located adjacent to the Nelson Gallery. Representing various historical periods and cultures, it is the Davis campus's major collection of art. Selected works are available for viewing weekday afternoons. The student-run **Basement Gallery** (916-752-0105 to leave a message) in the Art Building features art work by undergraduate UCD art majors. The work changes weekly and is hung by the artist with direction from the department peer adviser.

The **C. N. Gorman Museum** (916-752-6567), located in TB 111 (across from 194 Chemistry Building), was established in 1973 in honor of Carl N. Gorman, artist, advocate and former faculty member of Native American Studies on campus. The museum features changing exhibitions of works by contemporary Native American and other ethnic artists. Selections from the permanent collection of art and artifacts are also exhibited on a rotating basis throughout the year.

The Committee for Arts and Lectures (916-752-2523), located in Freeborn Hall, brings a wide variety of touring performing artists to UC Davis to serve both the campus and surrounding communities. During the academic year, Arts and Lectures presents concerts

and recitals by classical, jazz, and folk music artists; drama; classical, modern, and ethnic dance; and lectures by eminent public figures. Various departments such as English, the foreign languages, and history sponsor lectures, poetry readings, and exhibits open to the University community. *Dateline*, a weekly campus newspaper published by the News Service Office (916-752-1930) and *Special Events*, a monthly flyer distributed by the Campus Events and Information Office (916-752-1920) list upcoming activities. Bulletin boards, kiosks, the student radio station KDVS, and the *California Aggie* also advertise programs and local events.

## RECREATIONAL FACILITIES AND PROGRAMS

No matter what your recreational bent—horseback riding, an outdoor adventure, music listening, arts and crafts, bowling, swimming, or sports—the Davis campus has a place where you can enjoy it.

Facilities and programs such as the Equestrian Center, Craft Center, Outdoor Adventures, Recreation Hall, Intramural Sports, MU Art Gallery, Recreation Swimming Pool, or the MU Games Area will help you balance the academic demands at UCD with your leisure interests.

## Memorial Union and Campus Recreation

### Information:

Memorial Union Programs and Campus Recreation  
463 Memorial Union  
916-752-1730

The **Memorial Union** (MU) complex, directly north of the Quad, serves as the community center for the campus by providing campus services and a variety of extracurricular activities. Bring yourself up-to-date on local events by stopping at the MU Campus Information Center in Griffin Lounge on the main floor. A valuable resource for current students as well as new students and visitors, the Center can also be reached by telephone, 916-752-2222. Other first-level facilities include the UCD Bookstore, Corral gift shop, and Coffee House.

King Lounge on the second floor features music listening and periodicals in a comfortable and relaxed atmosphere popular for studying. The MU Art Gallery and a complex of meeting rooms, the MU II Conference Center, complete the second floor. In addition to the administrative offices of the Memorial Union and Campus Recreation, the offices of ASUCD, Campus Events and Information, and Student Activities and Judicial Affairs can be found on the third and fourth floors of the MU tower. Freeborn Hall is a recently renovated 1,250-seat assembly hall used for dances, performing arts, banquets, lectures, and conferences. The Arts and Lectures Office and the Campus Box Office, where you can purchase tickets for campus events and cash checks, are in Freeborn.

Outdoor patios furnished with wooden benches and umbrella tables offer an inviting open-air seating environment.

In addition to the overall operation of Memorial Union facilities, professional and student staff of the Memorial Union and Campus Recreation office coordinate the

following facilities and programs:

The **Craft Center** in the South Silo, a new center for student activity, is an ideal place to channel your creative energy. Facilities are available on a drop-in basis, or passes may be purchased for more frequent use of the equipment and work space. Workshops and classes are offered each quarter in such varied crafts as woodworking, weaving, jewelry-making, art and graphics, ceramics, photography, silkscreen printing, welding, leatherworking, and stained glass. More information can be obtained by calling 916-752-1475/1730.

The **Equestrian Center**, southwest of the Veterinary Medical Teaching Hospital off Garrod Drive, is active all year round providing trail rides, practice sessions, and instruction in both English and Western riding. Group and private lessons are available for beginning through advanced levels, and an extensive volunteer program has been designed to provide an educational experience for those interested in horse care and stable management. The Equestrian Center sponsors clinics, horse shows, summer equestrian camps, and special events, and also coordinates the Polo and Equestrian Clubs for student participation. Telephone 916-752-2372/1730 for further details.

The **MU Art Gallery and Music and Periodicals Center**, adjacent to King Lounge on the second level of the Memorial Union, feature a changing series of contemporary and historical art exhibits throughout the school year. Print sales, special programs, and lectures are sponsored by the Gallery, as well as internships for those interested in career work in an art gallery or museum. The Music and Periodicals Center provides current periodicals for leisure reading and has a library of albums for your listening pleasure. Further information regarding these services may be obtained by calling 916-752-2885/1730.

The **Games Area**, located below the UCD Bookstore, is a recreational facility consisting of a bowling center with pro shop, billiards room, video arcade, lounge, snack bar, and storage lockers. The Games Area conducts bowling leagues, classes, clinics, and tournaments for all ages from beginning through advanced skill levels. The facility is wheelchair accessible. Details are available by calling 916-752-2580/1730.

The **Outdoor Adventures**, in the Barn on the corner of California and Hutchison, is a valuable resource center for planning your outdoor excursions and developing your outdoor skills. Rental equipment of professional quality is available as well as resource information from an up-to-date library of topographic maps, trail guides and other materials. Classes, excursions and clinics in backpacking, rock-climbing techniques, white-water rafting, kayaking, sea kayaking, boardsailing, mountaineering, cross-country skiing, and other sports are offered throughout the year. Group rates and custom-designed trips can be arranged. Many special activities such as wilderness emergency-care clinics, white-water river guide training, slide presentations, and programs conducted by outdoor experts are also held. Stop in and share your own outdoor experiences! For more information call 916-752-1730.

The **Recreation Swimming Pool**, at the corner of La

Rue Road and Hutchison Drive, is a large free-form pool with a separate wading pool, a bathhouse, shuffleboard courts, and an extensive grass area for sunbathing. The staff offers lessons to all age groups and arranges for special events such as "family nights." The pool opens for the season in April and closes in October. The **Hickey Gymnasium Pool** is also available on a limited basis for noontime recreational lap swimming. More information regarding these services can be obtained by calling 916-752-2695 or 916-752-1995/1730.

The Memorial Union has several facilities that can be rented for group gatherings. With its rustic wood-paneled interior and ceiling-high windows, **Rec Pool Lodge** is an ideal location for meetings, lectures, or dances. The eaves-covered patio surrounding the lodge offers a lovely, shaded environment for outside dining during the warm weather months. Situated in the secluded Arboretum on the southwest perimeter of campus, **Putah Creek Lodge** provides a relaxing atmosphere for lectures, banquets, weddings, or dances. The spacious lawn surrounding the lodge is available for a variety of activities like volleyball, receptions, and picnics. Additional lodge amenities include kitchens and outdoor barbecues.

The **Silo Union** expansion is nearing completion while the Memorial Union is in the midst of a major expansion to meet the needs of our growing campus. If you have questions about these facilities or would like to make a reservation, contact Campus Events and Information at 916-752-2813.

Two special programs of the Memorial Union, the **MU**

#### Campus Information Center and Leisure Education

**Programs** promote balanced, healthy living. Through information and referrals, the Center links people and their interests with appropriate resources. The Center is open weekdays from 8:00 a.m. to 5:00 p.m., or call 916-752-2222. Leisure Education Programs offer a variety of presentations on personal balance and well-being as well as recreational opportunities available on campus. Presentations are available for your group by calling 916-752-1730.

#### Recreation Hall

Information:  
Entrance 1B  
916-752-6073

Recreation Hall is a multi-use arena available for intramural and informal recreation play, intercollegiate athletics, physical education classes, sports clubs, and special events. The tri-level facility has locker rooms; a flat running track; an equipment room; handball, racquetball, wallyball, and squash courts; a weight room with free weights, universals and a self-guided circuit training concept that utilizes hydraulic machines; main court areas for basketball, volleyball, and badminton; and areas for martial arts, table tennis, gymnastics, aerobics, and dance.

Students can use Rec Hall facilities by showing their current, valid photo ID card. Nonstudents may purchase a privilege card at the Rec Hall to use lockers, equipment, and facilities. Patrons may also purchase a daily pass at the 1B entrance. Rec Hall is open Monday through Friday from 6:00 a.m. to midnight throughout the academic year.



Numerous special events sponsored each year by the ASUCD, Entertainment Council, and the campus are held in the 8,600-seat Recreation Hall.

Recreation Hall maintains an outdoor fitness cluster on Orchard Field, the tennis courts on La Rue Road, just north of the Rec Pool, and the volleyball and basketball courts west of the Segundo residence hall complex. While these courts are primarily for student use, they are also available to the general community. The courts cannot be reserved and are available on a first-come, first-served basis.

### Intercollegiate Athletics, Intramurals and Club Sports

#### Information:

264 Hickey Gymnasium  
916-752-1111 (Intercollegiate Athletics)  
916-752-3500 (Intramurals and Club Sports)

Intercollegiate athletics, intramurals, and club sports programs collectively provide organized sports competition and physical recreational activities across the broad spectrum of student physical abilities. The underlying objective is to offer a coordinated program of sports participation that meets student needs at every level of competence and depth of interest.



Although intercollegiate athletics at Davis is intended to benefit the campus by providing *esprit de corps*, its prime role is to provide personal development opportunities for as many non-scholarship student-athlete participants as facilities and resources permit. Currently, the program consists of varsity teams in eleven men's sports and nine women's sports. Membership affiliation is with the Northern California Athletic Conference and Division II of the National Collegiate Athletic Association. Approximately 1,000 students compete on varsity or junior varsity teams each year. The club sports program includes both recreational and competitive offerings involving thirty-seven sports with 2,100 participants per year, while the intramurals program provides competition in thirty-six sports and serves approximately 14,000 participants.

### ASSOCIATED STUDENTS (ASUCD)

#### Information:

Executive Council Office  
370 Memorial Union  
916-752-3632

ASUCD Main Office  
364 Memorial Union  
916-752-1990

The Associated Students of the University of California, Davis (or ASUCD), authorized by The Regents and the Chancellor, represents all undergraduate students. From the fees paid to the University each quarter, The Regents allocate \$23.50 per student to ASUCD to support the organization and its many activities. Graduate and professional students may have access to all ASUCD activities and services by paying the fee although certain services are available to these students by their participation in the Graduate Student or Law Student Associations. Funds allocated to ASUCD provide activities and services that will make life as a student a little easier, less expensive, or just more fun.

The student government budgets the allocated funds each year through its Executive Council. Based on the city council form of government, the Executive Council consists of seven elected council members and the Council President and Vice President. The Council is the policy-making body for ASUCD and supervises all aspects of the association. The Council President is the chief administrative officer for ASUCD and is assisted by the Vice President who serves as the executive aide. ASUCD is the liaison for the undergraduate student body and represents the students with other universities, the Universitywide administration, The Regents, and the Davis city government.

Five **commissions** are subordinate advisory bodies of the Executive Council, and assist the governing board with its decisions by researching legislation and making recommendations. Commission chairpersons are ex-officio members to the Council. Each commission also involves itself with various projects that relate to their specific area.

- External Affairs deals with off-campus concerns (City of Davis, The Regents, social responsibility, etc.).
- Internal Affairs recommends policies to improve the quality of nonacademic student life on campus.
- Academic Affairs acts as an advocate to student rights in the area of academics, including dealing



with the Academic Senate and with issues such as grading policies, tenure, and teacher evaluations.

- Business and Finance makes recommendations to the Executive Council on all financial matters.
- Ethnic and Cultural Affairs makes recommendations on policies and programs concerning UCD's ethnic community, for establishing liaisons and achieving rapport with on-campus and off-campus bodies affecting ethnic students and their quality of life while at the University.

The **Judicial branch** is comprised of two boards whose members are appointed by the Executive Council Chair.

- The Student Judicial Board is responsible for determining eligibility of candidates for elective office in ASUCD and interpreting and enforcing the ASUCD Constitution.
- The Student Appeals Board rules on appeals to Student Judicial Board decisions.

ASUCD operates more than fifty activities and services for UCD students. Information about these services can be found in the *Student Directory*, which combines details about ASUCD services and organizations and the ASUCD directory, or by visiting the ASUCD offices in the Memorial Union.

Some of the services operated by the ASUCD for University students include the Unitrans bus system, *California Aggie* newspaper, *Student Viewpoint* evaluation of professors and classes, Just Your Type word-processing service, the Bike Barn repair services, travel service, free legal advice, and the Coffee House in the Memorial Union. The ASUCD-sponsored Experimental College offers a variety of nontraditional classes each quarter for students interested in diversifying their educational experience. Other ASUCD activities

include Radio KDVS stereo FM, Classical Notes and Campus Copies, *The Third World Forum* newspaper, Homecoming, Student Forums, Entertainment Council, Whole Earth Festival, and Picnic Day. ASUCD also cooperates with Associated Student groups on other University of California campuses to operate a full-time Student Lobby in Sacramento to represent student interests to state government, as well as a full-time student lobby on the national level to represent student interests on such matters as financial aid.

## STUDENT ACTIVITIES

Information:  
Student Activities  
4th Floor, Memorial Union  
916-752-2027

There are over 250 registered student organizations at UCD which represent a wide variety of student interests, including cultural, social, religious, political, ethnic, academic, international, recreational, performing, residence hall, and service groups. The **Student Activities** Office registers these diverse groups and provides advising on activities, resources, and campus policies. In addition to the subunits described below, Student Activities administers a number of campus programs: Club Finance Council, Activities Faire, Leadership Training Programs, and national collegiate leadership awards competitions. Student Activities staff assist individual students who want to become involved in activities or start new organizations. All students are encouraged to drop by the office to review the resources available to them.

**Cultural Days** is an annual series of programs celebrating the diverse ethnic cultures of the university community. They include African American Family Festival, Asian Pacific Cultural Week, Semana de la Raza, and the Native American Powwow. Everyone is invited to share in these programs featuring speakers, workshops, films, entertainment, and family events.

The **Cal Aggie Marching Band** entertains spectators at athletic, campus, and community events. As one of the last remaining "student-run" bands in the nation, the band has a style and personality all its own. The UCD **Spirit Squad** is a group of talented and enthusiastic dancers, stunt team members, and gymnasts who travel and perform with the band.

The **Danzantes del Alma** is a performing dance troupe that seeks to perpetuate Chicano and Mexican culture through the traditional music, dance and costumes of Mexican folklore. All interested students are invited to participate in the troupe.

## JUDICIAL AFFAIRS

Information:  
Student Judicial Affairs  
4th Floor, Memorial Union  
916-752-1128

Student Judicial Affairs supports the standards of the campus by responding to alleged violations of University policies or campus regulations. In addition, the office coordinates the informal resolution process and receives formal complaints for student grievances based on impermissible discrimination or harassment (sexual, racial, religious, handicap, etc.), or on violations of student rights to obtain access to or prevent disclosures from their campus records. The office also serves as a resource for conflict resolution and it can provide interpretations of University policies and regulations.

### Student Conduct and Discipline

Students enrolling or seeking enrollment in the University assume an obligation to act in a manner compatible with the University's function as an educational institution. Rules concerning student conduct, student organizations, use of University facilities, and related matters are set forth in both University policies and campus regulations. Standards for student conduct are included in the *UCD Code of Academic Conduct*, in the *Student Activities Handbook*, in the *Guide to Residence Hall Life*, and in the booklet, *University of California Policies Applying to Campus Activities, Organizations, and Students*. The operation of the campus student disciplinary system is outlined in the booklet *UCD Administration of Student Discipline*. These policies and regulations are available from the Office of Student Judicial Affairs, 463 Memorial Union.

A one-sheet summary of student conduct expectations is distributed in the registration process. Misconduct for which students are subject to discipline includes, but is not limited to, plagiarism, cheating, knowingly furnishing false information to the University, sexual or other physical assault, threats of violence, harassment, forgery, theft, vandalism, hazing, and alteration or misuse of University documents, records, keys, or identification. Disciplinary sanctions which may be involved range from a warning to dismissal and/or restitution.

Alleged violations of campus or University standards should be referred to the Office of Student Judicial Affairs. If complaints cannot be resolved informally between Student Judicial Affairs, the accused student, and the referring party, the case may be referred to a hearing before the Student Conduct Committee, Campus Judicial Board, or a hearing officer. The President

of the University, through the Chancellor, has ultimate authority for the administration of student discipline.

### Student Responsibility

You are responsible for compliance with the announcements and regulations printed in this catalog and in the *Class Schedule and Room Directory*, published in the campus newspaper, and with all policies, rules, and regulations of the University and this campus.

You will not be able to register, receive transcripts of record, or diplomas until you have met all University obligations.

## GRADUATE STUDENT ASSOCIATION (GSA)

Information:  
Room 253, South Silo  
916-752-6108

GSA is the officially recognized student government for UC Davis graduate students. GSA is a vital communications network which links graduate students from all corners of the campus to other graduate students and to the UCD administration. GSA provides a place for discussion of any issue affecting graduate student academics or quality of life. Every graduate program should have elected or designated GSA representatives. For GSA to advocate graduate student concerns effectively, input is needed from the graduate student body. GSA provides advocacy, services, and information to all graduate students, but in turn, needs your participation.

General Assembly meetings are held once a month and are open to anyone interested in attending. Each year several graduate students are elected to the GSA Executive Council in a variety of positions to carry out the policies and/or functions of the organization. A small portion of your registration fees is used to support the activities of GSA. Please find out about your student organization by calling or visiting the GSA office.

## ADVISING AND COUNSELING

In many ways, good advising is as important as good teaching. Several sources of advising and counseling—both academic and personal—are available to students at Davis. You may never need some of these services, but you'll be missing out on some important opportunities if you don't give them a try.

### Advising Services

Information:  
1st floor, South Hall  
916-752-3000

Advising Services coordinates the student service groups listed below. Professional staff and more than 70 student advisers are available to help you with your immediate concerns and with plans and possibilities for your future.

**Academic Peer Advising** places peer advisers in over forty departments 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 on the department. The Academic Peer Advising staff is trained to provide

information and assistance concerning graduate schools, career opportunities, and college requirements. For more information contact the main APA office in 108 South Hall, 916-752-3000.

**The First Resort** is a place to go if you are feeling bogged down by University red tape, registration procedures, course selection, choosing a major or other general advising questions. The student advisers here can either answer your questions or put you in contact with others who can. The staff can give you advice and assistance from the point of view of someone who has "been there." The First Resort maintains a tutor listing and referral service, a 1-3 unit course listing, and other valuable resources. Pregraduate school information is available, and graduate school bulletins and other supplemental materials on hand are useful in selecting a graduate program. If you have a problem, remember—start with *The First Resort* which is open from 9 a.m. to 4 p.m. throughout the academic year. (TB 98, across from the Chemistry building, 916-752-2807 for information or 916-752-3323, the advising hotline.)

The **Orientation and Summer Advising Office** provides coordination for the Summer Advising and Registration Program, Fall Quarter Orientation activities, Preview Day, and many other student assistance and orientation programs for new students. The staff seeks to help students learn about the campus environment, procedures, and opportunities, and to offer programs relevant to students' changing needs. Your contribution to orientation programs, through ideas and assistance, is always welcome. The coordinator's office is located in 108 South Hall, 916-752-3000.

The **Pre-Business School Adviser**, 359 Kerr Hall (916-752-6512 or 916-752-3000), is a student peer adviser who can assist you in seeking information about graduate schools in business, management, and public administration. This office also works with students who are in the process of applying to graduate school in business and distributes the Graduate Management Admission Test (GMAT) booklet. There is a useful library of business school catalogs and an informational handbook available.

The **Pre-Graduate School Information and Referral Service** is a program available through Advising Services to assist students interested in M.A., Ph.D., or teaching credential programs. Specific services include help in locating graduate school programs in specific fields, completing application forms and statements of purpose, and planning financial options. Advisers are available through the main Advising Services office, 108 South Hall. 916-752-3000.

The **Pre-Law Advising Office** is the place students interested in legal careers can come for information. The staff can advise you about admission requirements and program planning. The office maintains a reference library of law school bulletins, legal assistant information, admission test materials, and general career information. Many seminars and workshops are also held each year to provide students with more information for preparation for law school and a legal career. The pre-law adviser may be contacted in 108 South Hall, 916-752-3009.

The **Health Sciences Advising Office**, 106 South Hall, 916-752-2672, will be an important place for you if you are preparing for a profession in the health science area. The professional staff and student advisers can provide information on requirements, application procedures, professional school curricula, and related options. The office maintains an extensive library of school catalogs, statistics, and books and journals related to health education.

### Associate Dean of Students

Information:  
1st Floor, South Hall  
916-752-2019

The Associate Dean of Students provides advising, referral and program development to meet the needs of undergraduate and graduate students, particularly women students. The Associate Dean intercedes with faculty, academic, and Student Affairs administrators on behalf of students in academic or personal difficulty; interprets policies and procedures for students and parents; and works with schools, academic administrators and individual faculty to assist students in meeting UCD academic requirements. This office also provides leadership and influences policy and program development in the administration of activities related to the special needs of women and graduate students.



### Counseling Center

Information:  
219 North Hall  
916-752-0871

The Counseling Center offers confidential psychological, psychiatric and peer counseling services to students having problems which affect their academic progress and sense of well-being. Assistance is provided through a network of programs at three campus locations: North Hall, Cowell Student Health Center, and The House. All services are funded through student registration fees. Counselors help students manage their personal concerns and appropriately face

difficult and challenging situations. Students are encouraged to develop their personal insight, interpersonal skills, and strength of character.

A variety of counseling services is available to meet the needs of a large, diverse student population. A multi-disciplinary staff from the fields of psychology, psychiatry, and social work provide short-term individual and group counseling, crisis intervention, consultation, and referral. In addition, career interest inventory, personality testing, and information about graduate school admissions tests and the Planned Educational Leave Program are offered. Two peer counseling programs, The House and EOP/SAA Information Office, provide professionally supervised peer counseling and referral services.

To make an initial appointment, students can telephone or come to the Counseling Center. Students, faculty or staff who have a concern about a student or desire assistance in making a referral, are encouraged to call the Center.

### **The House**

TB 16  
24-Hour Hotline: 916-752-2790  
Business Line: 916-752-5665

Located in a green, two-story house next to the Housing Office, The House is a peer counseling program of the Counseling Center. The setting provides an informal environment where students can receive confidential support, information, and referrals regarding personal or interpersonal problems. The facility is staffed by well-trained student volunteers and is professionally managed. Peer counselor training is offered on a quarterly basis. Applications are available at The House.

Students can receive assistance through individual peer counseling and a wide variety of workshops and support groups. Students are always welcome to come in and enjoy the quiet atmosphere, free tea and coffee, and tours of The House. No appointment is necessary and services are offered on a drop-in or telephone basis. The House is open seven days a week and is wheelchair accessible.

### **Educational Opportunity Program/Student Affirmative Action (EOP/SAA)**

Information:  
313 North Hall  
916-752-3472

The Educational Opportunity Program/Student Affirmative Action Information Office serves EOP/SAA students by assisting them with their academic, social, and personal adjustments to the University environment; coordinating EOP/SAA new student orientation programs; as well as serving as liaison to staff, faculty and administrators. The Office's multicultural peer staff is particularly sensitive to differing social, cultural, and ethnic concerns and serves as a valuable resource to students. In addition, those students interested in pursuing the "helping" professions can receive training and experience through the Peer Adviser Counselor training program.

EOP/SAA Information Office services are also accessible at various outreach locations throughout the campus such as the Colleges of Agricultural and Environmental Sciences, Letters and Science, and Engineer-

ing; Learning Skills Center; The House; and all ethnic studies departments. All students are invited to telephone or stop by the EOP/SAA Information Office on the third floor of North Hall or any one of the outreach locations to find out more about the peer counseling services.

**EOP/SAA Tutoring** (Learning Skills Center, The Basement, South Hall, 916-752-2013) is a free service for EOP and affirmative action students. If you are having difficulty with your course work, the Learning Skills Center offers tutoring in most course areas. Tutoring is provided in groups and on a drop-in basis. For students in academic difficulty, pre-arranged one-to-one tutoring is also available. Although primary emphasis is on the assignments in your classes, tutorial services may also be used to improve study habits and learning skills. The tutoring program is staffed by students carefully selected for both their knowledge of course content and their sensitivity to the needs of students being tutored.

**Special Transitional Enrichment Program (STEP)** (Learning Skills Center, The Basement, South Hall, 916-752-2013). New EOP/SAA students (freshmen and transfers) admitted by special action are expected to participate in the Special Transitional Enrichment Program (STEP). Selected regularly admitted EOP/SAA students are encouraged to do so. The program begins in summer and continues through the first academic year, providing preparatory course work and developing academic skills. 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.

### **Learning Skills Center (LSC)**

Information:  
The Basement, South Hall  
916-752-2013

At the Learning Skills Center you can receive assistance in a wide variety of areas, including:

- General study skills
- Math/science study skills
- Writing essays and term papers
- Reading efficiency
- English as a second language
- Time-management
- Test-taking
- Test anxiety reduction and many more...

In addition to the above areas of assistance, the Center provides individual tutoring sessions to students on academic probation or subject to dismissal. Group and drop-in tutoring is available to all students.

Learning specialists can assist you individually, or you may participate in workshops covering specific areas of study. The Learning Laboratory has self-help tapes and films which enable you to work at your own pace. The LSC Library contains a variety of programmed instructional materials, reference books, and preparation materials for the GRE, MCAT, and LSAT exams, many of which may be checked out.

The Learning Skills Center is open Monday through Friday, from 8 a.m. to 5 p.m. Come in and inquire about our services, which are free to all UC Davis students.

## STUDENT SERVICES

### Student Health

Information:  
Cowell Student Health Center  
916-752-2300 (voice, and telephone device for the speech and hearing impaired)

Your health is important to you and to the University. Consequently, every new full-time student and every full-time student who returns after an absence must submit a medical history form, and evidence of rubella and rubella immunity to the Health Center as part of registration.

Since it is not intended that the Health Center supplant the medical care of your family physician, you are advised to have a physical examination by your own doctor before coming to UC Davis. Any problems capable of remedial treatment, such as diseased tonsils or imperfect eyesight, should be corrected to prevent loss of study time. Applicants with contagious diseases will be excluded from the classroom.

The services of the Health Center are made possible, in part, by your registration fees. As an enrolled student paying full registration fees, you are eligible to use the Health Center from the first day of the quarter through the last day of the quarter or to the date of official withdrawal. Some of the Health Center services and facilities are:

- General outpatient care
- Regularly scheduled clinics
- X-ray, laboratory, and pharmacy services
- Physical therapy
- Women's Clinic

The Health Center currently does not provide services for dental problems, or routine eye care.

The services of the Health Center are available to student's dependents on a fee-for-service basis. Also a Health Insurance Plan for your spouse and children may be purchased at the Health Center.

**Health Insurance.** Graduate, professional, and international students have a mandatory insurance plan that is purchased as part of registration. Undergraduate students have an opportunity to purchase a voluntary plan during registration. For more information, you may call (916) 752-2612 or visit the Insurance Office at Cowell Student Health Center, 8:00 a.m. to 5:00 p.m., Monday through Friday.

**Health Education.** Because maintaining good health is vital for the successful pursuit of your educational goals, the Health Education Program provides information and services through three programs. Trained peer counselors, workshops, and resource libraries are available through:

**Drink Responsibly in College** (916-752-6335) — Information on alcohol and other drugs, support and referral for students who have or know someone with a substance abuse problem.

**Health Advocates** (916-752-9651) — Information on nutrition, exercise, stress management, eating disorders, and other wellness issues.

**Peer Counselors in Sexuality** (916-752-1151) — Information on birth control, pregnancy, sexually transmitted diseases, sex roles and other sexual issues.

The Health Education Program is located in the Student Health Center. Call 916-752-9652 for more information.

### International Student Services (SISS)

Information:  
Services for International Students and Scholars  
300 South Hall  
916-752-0864

UC Davis currently has a community of over 2,300 international students and scholars, from approximately 90 countries, who are studying, teaching, and doing research in a variety of fields. Assistance to this varied group is provided by the staff of Services for International Students and Scholars.

The functions of the SISS Office are to assist incoming international students and scholars in making preparations to come to the U.S., to provide orientation to the campus and community upon their arrival in Davis, to assist them in maintaining their legal status while at UCD, and to facilitate the international transfer of funds in order to maintain their academic endeavors. In addition, immigration, personal, cultural, and financial advisement is provided.

Before fall quarter registration, a special orientation program is held for new international students. The program provides assistance with registration, class enrollment, housing, cultural orientation and immigration regulations as well as an introduction to campus services and community resources. All new and transfer international students are required to attend this program.

Careful budgeting is essential for international students. A minimum allowance of \$17,500 per year for a single student is recommended to cover nonresident tuition and fees, and living expenses. A married student must budget an additional \$2,500 per year for a spouse and \$1,000 for each child accompanying the family.

The University of California, Davis expects the international student to be responsible for the above costs. Prior to admission, the student must complete the Certification of Finances form certifying availability of funds for twelve months. It is important to note that tuition and fees may be increased without advance notice.

The international student should be cautioned that there will be numerous initial expenses during the first few months including cleaning and rent deposits for housing, telephone installation costs, bedding and cooking utensils, etc.

No financial aid is awarded by the University to international students during their first year of study. After the first year of attendance, very little financial aid is available to international students, and it is probable that in the near future, *no aid* will be available to them. Therefore, international students must be prepared to pay their expenses for the entire length of their stay at

Students must report to Services for International Students and Scholars as soon after their arrival as possible. This office can help with immediate needs, make introductions to the Davis international community, and assist students and scholars in locating other individuals from their home countries.

### **Women's Resources and Research Center (WRRC)**

Information:  
10 Lower Freeborn  
916-752-3372

The Women's Resources and Research Center brings attention to and challenges the barriers that inhibit the inclusion, equal power, and advancement of women. The Center promotes an understanding of the evolving roles of women and men, and helps women develop their full potential. To this end, the WRRC provides the UCD community with information and programs on the educational, career, and personal needs and interests of women. The WRRC's services are wide-ranging and include:

- Workshops, lectures, forums, conferences, and events on issues of particular interest to women
- A library containing books and other research materials on subjects related to women and gender.
- A free monthly newsletter, *Women's Writes*
- Classes in communicating with confidence
- Peer- and professionally-facilitated discussion groups
- Information on mental health, health care, employment, housing, campus and community events, marital problems, legal rights, legislation, child care, sexuality, and other issues
- Original research on gender roles and women's concerns
- Competitive grants for student research on women or gender
- Research consultation (assistance with designing and conducting research on women and gender roles)
- Assistance in obtaining academic credit; help in finding faculty members to sponsor 198, 199, and 299 courses

The Center is staffed by friendly, knowledgeable professionals and student interns. You are encouraged to drop by and talk with the staff. Student internships are available in legislative work, publicity, program planning, and research.

### **Student Employment**

Information:  
Student Employment Center  
114 South Hall  
(916) 752-0520

Need a part-time job to get through school? Do you sometimes need a few extra dollars for a special weekend event? Are you looking for work experience related to your major? If so, the Student Employment Center can help you.

The Center helps students who are enrolled in a full-time or part-time degree program, students on PELP, students' spouses, and students with a letter of acceptance for the following quarter who have not yet registered. The Center also coordinates the College Work-Study Program for financial aid recipients.

A variety of employment opportunities are offered on campus, in the city of Davis, and in adjacent communities. Full-time, part-time, and temporary jobs are available during the school year and vacation periods. New listings are posted daily. Listings of employment opportunities for the summer with government agencies, camps, and resorts throughout California are located at the Center. Students are encouraged to begin looking in January for summer jobs.

Offers of employment are conditional, subject to proof of identity and U.S. citizenship or your right to work in the U.S., as required by federal law (Immigration Reform and Control Act 1986).

The Center is open from 9:00 a.m. to 4:00 p.m.

### **Career Planning and Placement**

Information:  
The Internship and Career Center  
2nd floor, South Hall  
916-752-2855

Worried about your career plans? Do you know what kind of job you want when you graduate? Or are you one of the many students unsure about the career you want after graduation? If so, the advisers in The Internship and Career Center (ICC) can help you.

If you are an undergraduate, graduate, or alumnus, The ICC can assist you in (1) identifying your abilities and interests, and relating them to jobs; (2) gaining access to practical experience to increase your competitiveness in the job market; and (3) finding out how and where to look for the jobs you want. If you are considering dropping out of the University for a term or longer, an adviser can also give you information about internship opportunities.

Some of the resources you can find here include:

- The quarterly *Working Times* publication which lists information about The ICC's On-Campus Recruiting Program
- Quarterly schedule brochure of Center workshops and events
- Individual career advising and group seminars
- Workshops on resume writing, interviewing, and job-seeking skills
- Seminars to explore career fields and employment trends
- A Career Resources Library
- System of Interactive Guidance and Information (SIGI), self-help computerized guidance system which aids in values clarification and career decision making
- A manual for job-seekers
- Listings of current job vacancies
- Internship opportunities (applied work experiences) in all career areas

The Howe Career Resources Library contains material that can aid you in learning how your major field of study can be translated into job opportunities, as well as data concerning types of employment graduated students have obtained (summarized by academic major). Useful to job-seekers—and available free of charge—is the *Placement Manual*, prepared by the ICC, which provides guidelines for preparing a resume, tips on being interviewed, and information on employment in government, business, and education.

To assist students in finding jobs after graduation, the Center solicits and maintains job vacancy listings, arranges employment interviews, and schedules on-campus recruiting by employers.

Don't wait until you are a senior—about to be thrust into the job market—before thinking about your career interests. Visit the Internship and Career Center early—you'll be way ahead later. Advisers are available on a drop-in basis or by appointment.



### **Human Corps Program**

Information:  
The Internship and Career Center  
227 South Hall  
916-752-2855

Human Corps is a student community services program. Public service work can be a rewarding and satisfying experience which may also improve your qualifications for the job market. Service can be paid or non-paid and can take many forms, from a one-day activity to a long-term commitment.

The goal of Human Corps is to facilitate student involvement in community service by serving as a

referral center for students wishing to volunteer and a resource for agencies looking for volunteers.

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### **Education and Graduate Placement Services**

Any student enrolled in the teaching credential program or pursuing a master's or doctoral degree in order to teach, should register with the Education and Graduate Placement Office. Services include:

- Teaching job vacancy listings
- Placement files (professional dossiers)
- Special workshops on writing teaching resumes and curriculum vitae, and on preparing for interviews
- Individual advising

Advisers maintain contact with school district personnel and work with undergraduate students to explore teaching through internships. In addition, the office sponsors the Graduate Career Options Program for advanced degree candidates originally planning a teaching career and now considering other career options.

### **STUDENT SPECIAL SERVICES**

Information:  
South Silo  
916-752-2007

Student Special Services coordinates a collection of programs and services to meet the special needs of students as described below.

#### **Disability Resource Center**

Information:  
Disability Resource Center (DRC)  
160 South Silo  
916-752-3184 Voice/752-6TDD

If you have a physical, communication, or learning disability, you may find the advice, assistance, and specialized resources available from the Disability Resource Center very useful. Services are also available to students with temporary disabilities. The goal of this program is to help students with disabilities achieve maximum participation in campus life.

Academic and mobility resources for registered students with verified disability needs include the following:

- Funding and assistance to hire aides for instructional reading, writing, research and other access needs
- Sign language interpreting and notetakers
- Advice on compensatory strategies and alternative test formats for learning disabled students
- Specialized educational equipment—a reading machine, braille, tape recorders, and television aids for visually-impaired students; amplification equipment for hearing-impaired students
- Instruction in adaptive computer technology through our "High Tech Center"
- Priority registration and enrollment in classes
- Campus transportation services
- Minor repair services for wheelchairs and other specialized equipment
- Equipment loans for emergency needs, including tape recorders, electric carts, and wheelchairs

- Information on Section 504 of the Rehabilitation Act of 1973
- Referrals for disability documentation, tutoring, sources of devices, accessible public transportation, etc.

Counselors can help you with disability management strategies and career choices. You can also find assistance in obtaining financial aid to meet disability needs. Advising is available to assist with issues such as housing options, attendant recruitment and management, and independent living.

Campus accessibility is excellent: practically all instructional, recreational, and student facilities are wheelchair-accessible. Accessible on-campus housing is available, as well as a campus map showing physical accessibility features. The campus is flat and has a good curb ramp system. Ease of mobility, plus special class scheduling methods, can ensure that you'll make it from one class to another on time. Accessible buses link the campus with the community of Davis.

Preadmission counseling is available to individuals with disabilities. You are encouraged to contact DRC if the circumstances of a disability prevent you from demonstrating your ability to do university work or completing the subject or examination requirements for admission.

### Transfer/Reentry Student Services

#### Information:

Transfer Student Services: 916-752-2200  
Reentry Student Services: 916-752-2005  
160 South Silo

Transfer Student Services directly serves enrolled students who have transferred from other institutions of higher education. It provides information and assistance to ensure students an easy and smooth transfer to the University. It coordinates transfer student matters among existing student services units. It also sponsors special receptions and workshops for new transfers, links them to second-year transfers, publishes an annual *Transfer Guide* of available services and provides assistance to members of the Transfer Student Association.

Reentry Student Services directly serves enrolled students who have reentered the university after several years of life and work experience. It provides information and referral assistance using the Reentry Resource Network. The Network is composed of representatives from existing student services units, colleges, and divisions who are designated to assist reentry students (e.g., Women's Resources and Research Center, Financial Aid, Student Housing, the Dean's Offices, etc.). It also sponsors special programs for new reentry students and provides assistance to members of Advocates For Reentry Students.

### Veterans Affairs

#### Information:

Veterans Affairs Office  
160 South Silo  
916-752-2020

The Veterans Affairs Office assists veterans, dependents of deceased or disabled veterans, and reservists through a variety of federal, state and cam-

pus programs. The office certifies course attendance to the Veterans Administration, coordinates a tutorial assistance program, provides advice and support, and helps with employment, work study and financial aid concerns.

To initiate a benefit claim, write or drop by with your letter of admission. The office can give you the forms, information and advice to get your claim processed.

### TRANSPORTATION

**Parking.** Individuals who park a vehicle (including a motorcycle or moped) on the Davis campus must have a valid parking permit or pay at a meter Monday through Friday between the hours of 7:00 a.m. and 10:00 p.m. Parking lots on campus are financed solely by fees collected from parking permits and meters. Daily permits are currently \$2.00 per day and may be obtained from permit dispensers located in lots 1, 5, 25, 30, 47, 49, 50, 54, and 81. Long-term permits are required for all other parking lots, and may be purchased at the Parking Services Office, located on Extension Center Drive directly south of Lot 30 and the Rec Pool. For visitor parking information, please consult the South Gate Kiosk on Old Davis Road, or call Parking Services at 916-752-8277.

**Campus Shuttle.** The TAPS (Transportation and Parking Services) Intracampus Shuttle System provides service to the central campus area. Other TAPS shuttles provide service to the Medical Center, Research Park, and university facilities on Chiles Road.

**Buses.** Unitrans, seven bus lines operated by the Associated Students, serves the campus year round. Full service is provided each UCD school day (Mon-



day through Friday) and Monday through Thursday night during the regular school year—fall, winter, and spring quarters. Reduced schedule bus service operates during the summer, finals week, and all academic break periods. Finals and break schedules are available during the last week of classes each academic quarter. Schedules are available at the MU Information desk, bus terminals, City Hall, Chamber of Commerce, Post Office, and Unitrans office.

**Ridesharing.** Ridesharing is encouraged. Information on transportation alternatives to the Davis campus is available by calling 916-752-MILE or by visiting the Transportation and Parking Services Office located on Extension Center Drive. Information may be obtained on the following topics: carpooling and vanpooling (registered pools receive reduced parking rates as well as preferential parking), public transit, commuter match assistance, and shuttle systems.

## CHILD CARE PROGRAMS

Seeking assistance with child care? The following programs are available on campus and in the community to assist students in meeting their child care needs.

- The Community Housing Office distributes child care publications, coordinates child care information and referral services among a network of satellite campus units, and serves as the University's liaison with Kids On Kampus, Russell Park Child Development Center, and the City of Davis Child Care Services Program. For further information, contact Community Housing, 101 Student Housing Office, or telephone 916-752-2483.
- The UCD Registration Fee Child Care Subsidy Program assists full-time students with partial child care subsidies. Spouses must also be students or employed full-time. Parents can choose from licensed family day care providers and child care centers. For additional information, call City of Davis — Parks and Community Services at 916-756-3747 or drop by 23 Russell Boulevard.
- The City of Davis Parks and Community Services Department provides free child care resource and referral information. The program is funded jointly by the University of California, Davis; the City of Davis; and the State Department of Education. Up-to-date information is maintained on licensed family day care homes, in-home providers, child care centers, child care co-ops, playgroups, and other family-related services. Additional services include parenting workshops and handouts, a parenting resource library, and a book and toy lending library. It is located at 23 Russell Boulevard, telephone 916-756-3747.
- Kids On Kampus and Russell Park Child Development Center are privately owned and operated child care centers on the UC Davis campus. Both serve infants through school-age children. Reduced rates are given to residents of Russell Park, Orchard Park, and Solano Park student family housing. Information about Kids on Kampus can be obtained at 916-753-8716, and the telephone number for Russell Park Child Development Center is 916-753-2487.
- The Financial Aid Office can assist students who are parents and who qualify for financial aid with

allowances for dependent children (food, clothing, housing, basic medical costs), direct child care costs (in-home provider or child care center charges), and unanticipated medical expenses. This office is in 113 North Hall, 916-752-2390.

- The Early Childhood Laboratory is a teaching and research facility associated with the Human Development Program. Four different programs accommodate children from the ages of six months to six years for three hours a day, following the UC Davis academic calendar. Student families pay lower tuition than do UCD staff, faculty, and community-based families. The laboratory is located on campus, and the office is in TB 117, telephone 916-752-2888.
- For those living in on-campus Student Family Housing, parent associations in Orchard and Solano Parks sponsor low-cost cooperative playgroups. Morning sessions are held in each area for children ages two to five. Participation is limited to Student Family Housing residents. For further information or referral, telephone 916-752-4000, Orchard Park/Solano Park, Student Family Housing Office.
- The Perfect Tender infant care cooperative serves six infants under twelve months of age for no fee. Participation is limited to School of Law student parents while they are attending classes throughout the academic year. Contact 916-752-0243 for additional information.

## ALUMNI ASSOCIATION

Information:  
The Alumni Center  
Guilbert House  
112 "A" Street  
916-752-0286  
Toll free in California 1-800-242-GRAD

In choosing the University of California, Davis as your university, you are making a lifelong commitment...you will be identified with the Davis campus for the rest of your life. After graduation you will continue your association with UCD through membership and participation in the Cal Aggie Alumni Association (CAAA).

The Association and its alumni members have aided the Davis campus through support and sponsorship of many activities and programs including the Alumni Scholarship Program, Homecoming, Picnic Day, legislative relations programs, student recruitment, career networking, and the student loan fund. In addition, the Association maintains a professional staff dedicated to meeting the needs of UCD's more than 88,000 alumni.

Another exciting program includes area alumni chapters from Taiwan to Washington, D.C. The area chapters are led by local alumni boards who plan many activities for alumni including social, educational, family, and recruitment programs. So no matter how far away from Davis your life takes you, you can still be part of the UCD pride and spirit.

Each graduate of UCD is important. Membership in the CAAA is only \$30 per year. Members are afforded the many special programs and benefits of the Association. Call the Alumni Center for more information or drop by before you graduate and join the UC Davis network.

# Fees, Expenses and Financial Aid

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## FEES AND EXPENSES

It is extremely important to consider carefully 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 aid well in advance of enrollment. The deadlines for financial aid (grants, loans, work-study, and scholarships) can be found in the following pages.

While the needs and resources of each student are different, the following information will give you an idea of the basic expenses students at UCD will incur. Legal residents of California are not required to pay tuition at the University. Students classified as nonresidents must pay tuition of \$1,972 per quarter. (See the Appendix for the Statement on Legal Residence.)

At the time of registration each quarter, every student must pay the following fees:

### UNDERGRADUATE STUDENT FEES

University registration fee .....	\$ 214.00
Memorial Union fee.....	\$ 28.50
Associated Students fee .....	\$ 23.50
Optional undergraduate health insurance fee** .....	\$ (113.00)
Education fee† .....	\$ 301.00
<b>Total for California residents .....</b>	<b>\$ 567.00</b>
Tuition for nonresidents.....	\$1,972.00
<b>Total for nonresidents .....</b>	<b>\$2,539.00</b>

### GRADUATE STUDENT FEES\*

University registration fee .....	\$ 214.00
Memorial Union fee.....	\$ 28.50
Graduate Student Association fees .....	\$ 4.50
Health Insurance fee (fall 1990 rate).....	\$ 80.00
Education fee† .....	\$ 301.00
<b>Total for California residents .....</b>	<b>\$ 628.00</b>
Tuition for nonresidents.....	\$1,972.00
<b>Total for nonresidents .....</b>	<b>\$2,600.00</b>

**These fees are for the 1990-91 academic year and are subject to change without notice.**

\*Students in the School of Law should refer to the School announcement for explanation of fees.

†Students in the Schools of Law, Medicine, and Veterinary Medicine are not included (see the explanation of fees following).

‡Students approved for enrollment on a part-time basis are required to pay only one-half of the Education Fee and one-half of the Nonresident Tuition Fee.

\*\*A voluntary health insurance plan will be available to all undergraduates except for foreign undergraduate students who must pay the Graduate Student Health Insurance fee.

### Additional Fees and Expenses

Students may be subject to the following fees for optional services (rates subject to change):

*Parking* (per year: \$108 to \$180 for cars, depending on the type of permit; \$36 for motorcycles; \$48 for nighttime only permit, i.e., \$17 per quarter)

*Bicycles, fee for the California State License* (initial license, \$6, and renewals, \$3). Required for all bicycles on campus.

*Late payment registration fee (\$50)*

*Changes in class schedule after announced deadline (\$3, each petition)*

*Transcripts (\$3 a copy)*

*Diplomas can be mailed to an address left with Office of the Registrar (fee varies with current mail costs)*

*Applications for readmission, Planned Educational Leave, or intercampus transfer (\$40)*

For details concerning fees and deposits, consult the publication *1990-91 Student Fees and Deposits*, available from the Office of the Registrar. Current fees are also published in the *Class Schedule and Room Directory*.

**(Fees are subject to change without notice.)**

### Explanation of Fees and Expenses

**University Registration Fee:** \$214.00 per quarter for undergraduate and graduate students; \$321.00 per semester for law students. Revenue from this fee is used to support a portion of the cost of student services programs including cultural and recreational services (MU and Rec Hall), counseling and advising services, career planning and placement services, student organization and activities services, Learning Skills Center services, and health services. The health services portion of the fee can be treated as a medical expense deduction from income tax.

**Education Fee:** \$301.00 per quarter for undergraduate and graduate students; \$451.00 per semester for law students. Revenue from this fee is used for financial aid and related student programs.

**Nonresident Tuition:** \$1,972 per quarter; \$2,958 per semester for law students (see the Statement on Legal Residence in the Appendix).

**Memorial Union:** \$28.50 per quarter; \$42.75 per semester for law students. Paid by all students. This fee includes the student facility fee. Revenue from this fee is used toward planning and future expansion of student facilities on campus.

**Associated Students Fee:** \$23.50 per quarter. All undergraduate students, both full-time and part-time, are represented by the Associated Students of the University of California, Davis (ASUCD). Graduate and professional students may receive access to all services and activities by paying the fee (see also Graduate Student Association Fee following).

**Graduate Student Association Fee:** \$4.50 per quarter. Paid by all academic graduate students, including students in the Graduate School of Management, but not mandatory for professional students in the Schools of Law, Medicine, and Veterinary Medicine. Professional students may have access to the same services and activities by paying the fee.

**Graduate Student Health Insurance Fee:** Estimated at \$80.00 per quarter for fall 1990 and at \$96.00 per quarter for winter and spring 1991. For law students, \$120.00 is estimated for the fall 1990 semester and \$144.00 for the spring 1991 semester. Paid by all graduate students, including students in the Graduate School of Management and the Schools of Law, Medicine, and Veterinary Medicine, unless comparable coverage can be demonstrated or the student is eligible for a fee remission. Fee remissions are granted to certain teaching and research assistants. This fee is also paid by all *undergraduate* foreign students.

**Undergraduate Health Insurance Fee:** \$113 per quarter. Undergraduate students may purchase a voluntary health insurance plan during enrollment. Decision on a mandatory health insurance plan for undergraduates is pending.

**Law Student Association Fee:** \$5 per semester.

#### **Costs for a Year at UCD**

The Financial Aid Office estimates that in 1990-91 the average expenses of a single UCD undergraduate living off campus will total \$9,090, including \$1,676 for fees, \$636 for books and supplies, \$3,114 for housing, \$1,275 for food, \$1,710 for personal expenses, and \$679 for transportation.

Estimated expenses for other single students living off campus are: graduate students, \$9,575; Graduate School of Management, \$9,907; Law, \$9,690 to \$9,789, depending upon the year in school (first, second, etc.); Veterinary Medicine, \$9,758 to \$11,155, depending upon the year in school (first, second, etc.); Medicine, \$10,160 to \$14,196 depending upon the year in school.

The awards for married students are based on the same basic budget plus the addition of a standard child care allowance, unless documentation is provided about a spouse who is unable to work, in which case a dependent living allowance will also be awarded. Single parents' awards are based on the single student's budget and a child care allowance. If single parents' resources (earnings and benefits) are not sufficient to meet the basic living expenses of their dependents, a standard dependent living allowance may be awarded upon receipt of documentation.

The costs are average costs, and your own living expenses may differ somewhat from these. More information on living expenses can be found in the section on housing or obtained from the Financial Aid Office.

#### **FEE REFUNDS**

If you have to withdraw before the first day of instruction, you must fill out and return a "Cancellation of Registration" form to the Office of the Registrar, along with your validated I.D. Card. After the first day of instruction, you must fill out a "Petition for Withdrawal" and follow the same procedures.

#### **Refund Procedures**

##### **New Undergraduate Students:**

*Prior to Day 1*, Registration Fees paid are refunded in full except for the \$100 Acceptance of Admission Fee.

*Day 1 and after*, the \$100 Acceptance of Admission Fee is withheld from the Registration Fee and the Schedule of Refunds is applied to the balance of fees assessed.

##### **All Continuing and Readmitted Students and New Graduate Students:**

There is a service charge of \$10 for cancellation of registration before the first day of instruction. After the first day of instruction the Schedule of Refunds is applied to the total of fees assessed.

#### **Schedule of Refunds**

The Schedule of Refunds refers to calendar days beginning with the first day of instruction. Percentages

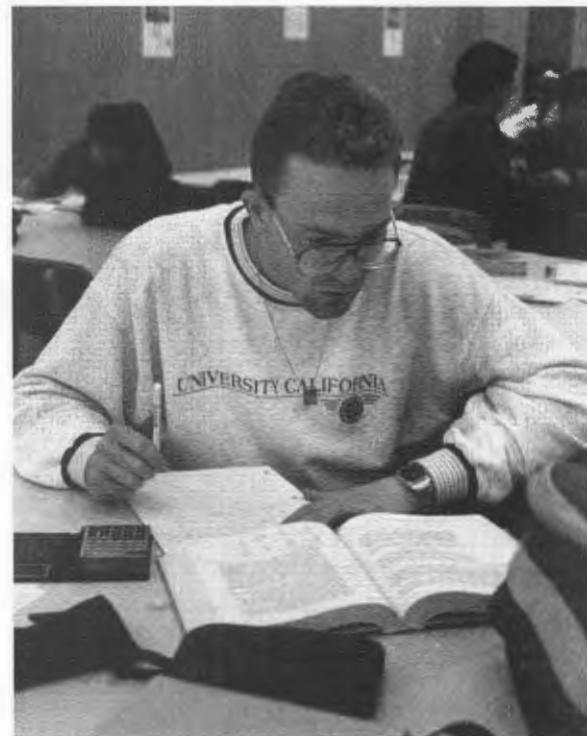
listed (days 1-35) should be applied respectively to Tuition, Education Fee, University Registration Fee, and other student fees. The effective date for determining a refund of fees is the date the student files an official notice of withdrawal with the University, and it is presumed that no University services will be provided to the student after that date.

#### **University Registration Fee, Education Fee, Non-resident Tuition and other student fees:**

1-14 days .....	80%
15-21 days .....	60%
22-28 days .....	40%
29-35 days .....	20%
36 days and over .....	0%

#### **Refund of Health Insurance Fee**

If you paid the Health Insurance fee, and you are cancelling your registration before the first day of instruction, you will be refunded 100% of this fee. After the first day of instruction, no refund of the Health Insurance fee will be issued. Any questions regarding the refund of this fee for withdrawals should be directed to the Student Health Center.



#### **FINANCIAL AID**

Information:  
Financial Aid Office  
113 North Hall  
(916) 752-2390 (TDD 752-3244)

#### **DEADLINES**

- January 1-** Applications for grants, loans, work-study and California Student Aid Commission awards for 1991-92 must be filed with a processor during this filing period for priority consideration
- March 1**
- January 14** Deadline for filing applications for fellowships and graduate scholarships for 1991-92 with the Graduate Division

The Financial Aid Office provides financial assistance in the form of scholarships, loans, grants, and work-study employment.

To ensure priority consideration, file your application for the 1991-92 academic year as soon as possible after January 1, 1991. The priority filing deadline is *March 1, 1991*. Students who miss the priority filing date may not receive funds to meet their full need. However, you should still apply for financial aid even after the priority deadline because application processing will continue until funds are depleted. Application instructions for prospective undergraduate students are in the *UC Undergraduate Admissions and Financial Aid Packet*. The Student Aid Application for California (SAAC) is available at local high schools, community colleges, and the Financial Aid Office. Continuing UCD students and prospective graduate students should obtain the SAAC and "Financial Aid—How to Apply, 1991-92" from the Financial Aid Office in December.

Undergraduates with outstanding academic records are encouraged to apply for scholarships. See "Scholarships and Awards" at the end of this section for information about scholarship applications or contact the UCD Scholarship Office, 207 North Hall, (916) 916-752-2393.

Graduate students are eligible for most of the same types of financial aid as undergraduates. In addition, graduate scholarships, fellowships, and teaching and research assistantships are administered through the Graduate Division. Eligibility for state graduate fellowships is based on grade-point average, test scores, and financial need. Awards are applied directly toward fees. A SAAC must be submitted to a processor by March 1, 1991.

Eligibility for most assistance is based upon demonstrated financial need. (Most scholarships are not need-based.) Eligibility is determined by the following formula: 1) the student is assigned a standard budget reflecting the average costs for a student attending UCD; 2) the student's resources are analyzed according to federal and state regulations; 3) the resources are subtracted from the budget, and the remainder is the amount of eligibility. The Financial Aid Office attempts to fill this amount with a combination of grants, work-study, and loans.

For more information, contact the Financial Aid Office. **Regulations and deadlines are subject to change.**

### **Satisfactory Academic Progress**

Federal regulations require that financial aid recipients meet the published Standards for Satisfactory Academic Progress for Financial Aid concerning units, grade point average, and maximum quarters of attendance allowed to obtain a degree. A copy of these standards is available at the Financial Aid Office, 113 North Hall. Review the policy in detail and discuss it with your academic adviser.

## **TYPES OF FINANCIAL AID**

### **Grants**

A grant is a gift 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.

**Pell Grants** are federally-funded awards. All undergraduate financial aid applicants are required to apply for a Pell Grant each year by following the instructions in the financial aid application packet. Recipients must be enrolled at least half-time and must maintain good academic standing and make satisfactory academic progress. Eligibility for a Pell Grant is determined by the federal government according to a formula developed by the Department of Education and approved annually by Congress. All applicants are notified via a "Student Aid Report" (SAR). All parts of the SAR must then be submitted to the UC Davis Financial Aid Office. The amount received depends on financial need.

**Cal Grants** are awarded by the California Student Aid Commission and may be renewed each year. All undergraduate financial aid applicants who are California residents are required to apply for one of these awards by following the instructions in the financial aid application packet.

*Cal Grant A* awards are based on financial need and academic achievement. Recipients must complete at least 36 units per academic year.

*Cal Grant B* awards are based on financial need and are for entering undergraduate students primarily from low-income backgrounds. Recipients are required to complete at least 12 units each quarter, unless the student receives permission to enroll for fewer units.

- *Cal Grant A* pays the full amount of registration fees.
- *Cal Grant B* pays a monthly stipend for living expenses for first-year students and a portion of the registration fees plus a monthly stipend for living expenses for students in their second- through fourth-year.

**University Grants** are available to both graduate and undergraduate students. The maximum varies each year depending on funds available.

### **Educational Opportunity Program (EOP) Grants are restricted to undergraduates.**

**Supplemental Educational Opportunity Grants** are awarded on the same basis as University Grants and are available to U.S. citizens or permanent U.S. residents who are at least half-time students and demonstrate exceptional financial need while pursuing their first undergraduate degree.

**Bureau of Indian Affairs (BIA) Grants** are awarded to students who are at least one-fourth American Indian, Eskimo, or Aleut as recognized by a tribal group served by the Bureau of Indian Affairs and who show financial need. Applicants must submit a regular financial aid application and provide supporting documents. Applicants should also write to the agency which administers their tribal affairs and request a BIA Higher Education Assistance application. The BIA Financial Aid counselor on campus can assist you with completing the application.

- Amount of BIA grant depends on need and availability of funds at each BIA agency.

### **Loans**

A loan is an award which does not have to be repaid until completion of studies. A financial aid offer almost

always includes a long-term, low-interest loan. Repayment of these loans begins after you graduate or withdraw from school.

**University Student Loans** up to \$18,000 per student are available for graduate studies, payment may be deferred until completion or termination of studies. Cosigner is required for annual amounts above \$1,000.

- \$4,500 undergraduate maximum for first 2 years
- \$9,000 undergraduate maximum during 4 years
- \$18,000 maximum for graduate students, including loans for undergraduate studies
- 5 percent interest (subject to change)
- Repayment begins 6 months after graduation or withdrawal

**Perkins Loans** (formerly National Direct Student 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. Repayment starts six to nine months after graduation or withdrawal from school and may be extended over ten 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.

- \$4,500 undergraduate maximum for first 2 years
- \$9,000 undergraduate maximum during 4 years
- \$18,000 maximum for graduate students, including loans for undergraduate studies
- 5 percent interest (subject to change)

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

- \$2,500 maximum for veterinary medicine and first-year medical students
- \$3,333 maximum for medical students in the second-, third-, or fourth-year
- 5 percent interest
- Repayment begins 12 months after receipt of the degree or withdrawal

**Stafford Student Loans (formerly GSL)** are available through banks and other lending institutions. These loans are based on financial need. Interest accrued while the student is in school is paid by the federal government.

- \$2,625 maximum per year for freshmen and sophomores, \$4,000 maximum per year for juniors and seniors, to \$17,250 maximum cumulative indebtedness for undergraduate students
- \$7,500 maximum per year to \$54,750 maximum cumulative indebtedness for graduate students
- 7-9 percent interest (may change on short notice)

- Repayment begins 6 months after graduation or withdrawal

**Health Education Assistance Loan (HEAL) Program** provides federally-insured loans to students attending the School of Medicine. The loans are made by participating lenders, including banks, credit unions, and savings and loan associations.

- \$20,000 maximum per academic year (or the financial need of the student, whichever is less)
- \$80,000 total maximum
- The HEAL Program does not provide a subsidy for interest
- Interest is set at 3 percent points above 91-day T-Bill rates
- Repayment begins 9 months after completion of formal training, including accredited internship and residency programs or withdrawal

**Parent Loans to Assist Undergraduates (PLUS) and Supplemental Loans to Assist Students (SLS)** are government-insured loans that are made to parents of dependent students, to independent undergraduate students, and to graduate or professional students by participating banks and other lenders, regardless of income and assets.

- Parents of (1) dependent undergraduate students **or** (2) dependent graduate and professional students may borrow \$4,000 per year to a maximum aggregate of \$20,000 for each dependent student
- Independent undergraduate students or graduate and professional students may borrow up to \$4,000 per year to a maximum aggregate of \$20,000
- There is no interest subsidy for this loan
- Repayment begins 30 after loan disbursement

**Short-Term, Emergency, and Teaching Assistant Loans** are designed to meet temporary or emergency financial needs of registered students. Loan funds are provided by UCD alumni, ASUCD, the Cal Aggie Foundation, The Regents of the University of California, and private donors.

- Short-term loan: \$300 maximum; the full amount of in-state registration fees for one quarter may be borrowed in the form of a fee voucher. The maximum repayment period is 5 months.
- Emergency loan: \$100 maximum; payment is due in 30 days. Available on a drop-in basis, Monday through Friday, 10:30 to 11:30 a.m. and 2:00 to 3:00 p.m.
- Teaching assistant loan: students who are in the teaching assistant, research assistant, associate-in, and postgraduate researcher classifications can apply for a maximum of one month's salary before and during Fall Quarter. The maximum repayment period is six months.
- The application for a Short-Term, Emergency, or Teaching Assistant Loan is available in the lobby of North Hall. For more information or to schedule an appointment, call (916) 752-6470, 10 a.m. to 12 noon and 2 to 4 p.m.

## Work-Study

The **College Work-Study Program** enables students to earn part of their financial aid through part-time employment. To participate, you must first receive Work-Study as a part of your financial aid package. Your Work-Study award offers you both money for your education and work experience. The Student Employment Center coordinates College Work-Study (see below).

**Federal Work-Study** is funded by the federal government. Employment may be on or off campus with profit or nonprofit organizations. To be eligible, you must be a citizen or permanent resident of the U.S., must carry at least a half-time academic course load, and must maintain minimum academic progress.

**California State Work-Study** is funded by the state, and employment may be with profit or nonprofit organizations. The employment must be educationally beneficial or related to a particular career interest or the exploration of a career option. To be eligible, students must meet the requirements for federal student aid eligibility and be California residents.

**University Work-Study** is funded by the University of California, and employment is limited to jobs on-campus. This program is primarily used for international students with financial need who would be ineligible for Federal Work-Study.

The **Student Employment Center** helps students, including those on the Planned Educational Leave Program, and their spouses find both part-time and temporary full-time employment on and off campus during the school year and vacation periods. Job opportunities are available in many fields of interest and require skills ranging from entry level to highly technical. For further information, see "Student Employment" in the Student Life section of this catalog.

## SCHOLARSHIPS AND AWARDS

Information:  
Scholarship Office  
207 North Hall  
(916) 752-2393

At UC Davis a special effort is made to recognize exceptional students. Approximately 150 different undergraduate scholarships are administered by the Scholarship Office, and many more scholarships are handled through outside agencies.

Scholarships are awarded on the basis of academic excellence and exceptional promise. Recipients are chosen by committees made up of both students and faculty. In addition to academic records (a minimum grade-point average of 3.25 is required), selection is based on letters of recommendation, test scores, and a personal essay in which your University goals and objectives are stated. *Some awards may be 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 re-apply each year for scholarship aid.

Students applying to the University for the fall quarter are considered for scholarships using the same forms completed for admission purposes. Continuing students and applicants for winter or spring quarter

should obtain a UC Davis scholarship application from the Scholarship Office in October. These applications are due in mid-December. Announcement of winners is usually made beginning in mid-April.

Graduate students are also eligible for various scholarships and fellowships.

**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 (a \$500 per year award) or may be accompanied by a stipend generally covering the difference between family resources and yearly educational costs. The Regents Scholarship Administrative Committee conducts personal interviews during the final selection process. These scholarships are renewable as long as you maintain a 3.25 grade-point average.

- Dollar amounts vary—up to full financial need
- 2-year and 4-year renewable scholarships

**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.

- \$500 maximum
- 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. UCD scholarship students participate in the Military Science (ROTC) Program. Information and applications are available from the Department of Military Science, 125 Hickey Gymnasium, 916-752-0543.

- 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.

- Generally \$100 to \$2,000

**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

# Admission

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## APPLYING TO UC DAVIS

The key to preparing a successful application is supplying us with accurate, complete, and timely information.

The first step in applying for admission is to select a major or area of interest within a college that best suits your academic goals. To assist you in this choice you will find an overview of undergraduate studies listed within each College section. The second step is to determine the admission category to which you belong. (See Explanation of Application Categories further on in this section.) This is a very important step because entrance requirements and filing dates may vary depending on your category of admission. The third step is to obtain and complete the Undergraduate Application for Admissions and Scholarship, returning it during the appropriate filing period. The final step is to arrange to have all supporting documents—official test scores and transcripts—forwarded as early as possible.

A summary of the steps in the application procedure appears on the next page. Use the checklist and application instructions to follow your application through the admissions process.

On the application form there is a question that allows you to request information on financial aid and housing. Once your admissions application has been submitted you should keep in contact with the Financial Aid, Scholarship, and Student Housing Offices since admission to the University does not automatically include the awarding of financial aid, scholarships, or housing.

The Disability Resource Center encourages applicants with a physical impairment to identify their disability on the application and discuss in the essay how it has affected their education. Contact that office for further information concerning admission or assistance if needed.

The Academic Reentry Program offers assistance to undergraduate applicants age 25 or older and to graduate applicants age 30 or older.

## Office of Relations with Schools/EOP Outreach Services

Information:  
2828 Chiles Road  
916-757-3108

The Office of Relations with Schools/EOP Outreach Services is the University's link with secondary schools and community colleges within the state. Services and programs provided by the office include:

- Visiting schools to provide information about UCD to prospective students, counselors, school administrators, teachers, and parents
- Presenting conferences to acquaint the public with University programs
- Developing and distributing publications describing UCD's programs and academic majors

- Coordinating information about course equivalencies and credit between the community colleges and UCD
- Administering a recruitment program designed to attract underrepresented and low income students to the University

The Educational Opportunity Program/Student Affirmative Action (EOP/SAA) is a major effort of the Office. These special programs in the junior high schools, high schools, and community colleges are aimed at encouraging students from underrepresented groups to become eligible for regular admission to the University.

Programs include the Early Academic Outreach Program in the junior high schools and high schools; the Immediate Outreach Program in the high schools and community colleges; and Upward Bound, a pre-college motivational program in the high schools. The office also sponsors summer residential programs on the Davis campus to give students the opportunity to experience the diversity of University life through residence hall living, special classes, trips, and lectures.

## ADMISSION CHECKLIST

- 1. Obtain the undergraduate admissions packet from your high school, a community college, or a campus of the University of California. If you are not a California resident, request an application from the Undergraduate Admissions Office, 175 Mrak Hall, University of California, Davis, CA 95616.
- 2. Complete the application including the essay and list the college and major you prefer. Attach a check or money order to cover the Application fee with your application materials, and return them in the preaddressed envelope **during the priority filing period for the quarter in which you are interested.**
- 3. Retain for your records the notices received from both the Undergraduate Application Processing Service and the Undergraduate Admissions Offices which acknowledge receipt of your application.
- 4. If you are applying from high school, do not send a preliminary transcript unless requested to do so by Undergraduate Admissions. If you are applying as an advanced standing student, arrange to have all official transcripts sent. If test scores are required, please arrange to have these forwarded by the testing agency.
- 5. High school applicants to the fall term should make arrangements to take the SAT or ACT and three Achievement tests by no later than December. We strongly encourage that these tests be completed by the November test date.
- 6. Respond to Undergraduate Admissions Office requests for additional information, such as transcripts, test scores, or confirmation of work in progress. **Note: Your eligibility for admission cannot be evaluated until all your application materials are received**, i.e., application form, filing fee, essay, official transcript (if required), work in progress, and test scores (if required), therefore it

is important to make arrangements for these requests if you want to avoid delay in the processing of your application.

- 7. If you are admitted, keep your admission letter for your records.
- 8. Return your "Statement of Intent to Register" (SIR), "Statement of Legal Residence," and Student Address form along with the nonrefundable advance deposit of \$100 (if required), as soon as possible and no later than the date stated on the SIR so your registration materials can be ordered before you register.

## VISITING THE CAMPUS

Information:  
Information Services Office  
129 Mrak Hall  
916-752-0539

You may wish to arrange a visit to UC Davis sometime before you apply. If you have specific questions about application procedures or entrance requirements, it is a good idea to write or visit the Undergraduate Admissions Office. No appointment is necessary. For individual or group weekday tours of the campus, contact the Information Services Office at least four or five days in advance. Weekend tours depart from Mrak Hall at 11:30 a.m. and 1:30 p.m. No appointment is necessary.

## PREPARING FOR UNIVERSITY WORK

A carefully planned program of high school courses provides you with the best preparation for University work. As a prospective University student, you should give priority to completing the high school courses required for admission—the "A-F" requirements.

You should take college preparatory courses that will challenge you to work hard and will prepare you beyond minimum levels of competence in reading, writing, and mathematics. A student who is *well-prepared* for University work will have taken four years of English in high school, four years of mathematics, two to three years of foreign language, two to three years of laboratory science, one year of history, and one or more years of art or humanities.

**Reading:** You should become proficient in reading and understanding technical materials and scholarly works. You should learn to read analytically and critically, actively questioning yourself about the author's intentions, viewpoint, arguments, and conclusions. You should also become familiar, and comfortable, with the conventions of standard written English, and with various writing strategies and techniques. Your reading experience should include original works in their entirety, not just textbooks and anthologies, and should encompass a wide variety of forms and topics.

**Writing:** Effective critical thinking and proficiency with the written language are closely related, and both are skills which every University student must master. By University standards, a student who is proficient in English composition is able to: a) understand the assigned topic; b) select and develop a theme by analysis and argument; c) choose words which aptly and precisely convey the intended meaning; d) construct effective sentences, i.e., sentences that eco-

nomically and successfully convey the writer's ideas and display a variety of structures; and e) demonstrate an awareness of the conventions of standard written English.

If you plan to attend the University, you must take English courses in high school that require the development and practice of these skills. You must take at least four years of English composition and literature that stress expository writing: the development of persuasive critical thinking on the written page.

**Mathematics:** Many undergraduate majors require preparation in mathematics beyond the three years required for admission to the University. All majors in the natural and life sciences, engineering, and mathematics require calculus, and many majors in the social sciences require statistics or calculus, or both. Calculus is also required for undergraduates preparing for careers in the environmental sciences, dentistry, medicine, optometry, pharmacy, and biostatistics. If you select a major which requires either calculus or statistics, you should expect to take that course during your first year at the University.

You should prepare yourself for University courses in mathematics while you are still in high school. Good preparation includes a year of mathematics beyond second-year algebra (such as precalculus, mathematical analysis, analytic geometry) and, definitely, a course in mathematics during your senior year.

The ability to use algebra to solve problems is necessary for success in University mathematics courses. Students who do not take a mathematics course during their last year in high school often find they need to take a preparatory course at the University in order to renew their algebra skills. The need to take such a course at the University could delay undergraduate studies for which mathematics is a prerequisite.

Finally, you should take advantage of any guidance your high school may offer in study skills. Managing your time well and studying effectively are critical to excelling at the University. Together with solid academic preparation, these skills should enable you to realize your educational goals and, ultimately, fulfill your career aspirations.

## APPLICATION PROCEDURES

### The UC Application System

Students seeking admission to the University of California are able to have their applications considered simultaneously at more than one campus.

Under this system, you submit one application to the University indicating the campus or campuses you wish to attend. A copy of the application is then forwarded to each of the campuses you list. For information regarding the filing fee, consult the application packet.

Undergraduate application packets may be obtained from any California high school, community college, or University of California Admissions Office. Complete the application materials following the instructions included in the packet. Communications concerning admission to the UC Davis campus should be sent to the Undergraduate Admissions Office, 175 Mrak Hall, University of California, Davis 95616.



A nonrefundable application fee must accompany your application. Please make your check payable to The Regents of the University of California. If you have applied previously and were ineligible, or if you were admitted previously and did not register, you are required to file a new application for the quarter for which you seek admission and submit a new application fee.

Initial filing dates are the same for all UC campuses and are listed below. All applications will be considered if filed during the priority filing period. The Davis campus may continue to accept applications beyond the initial filing period; however, after the priority filing period, some departments or colleges may close to new applicants as enrollment quotas are filled. Once a department or college has closed, any additional applications which are received will be notified of alternatives on other UC campuses by the Undergraduate Application Processing Service.

**The initial filing periods for new applicants are as follows:**

**Quarter of Attendance**

Fall quarter 1991

\*Winter quarter 1992

†Spring quarter 1992

**Filing Periods**

November 1-30, 1990

July 1-31, 1991

October 1-31, 1991

\*An applicant seeking admission to the Winter Quarter may not attend fall sessions at schools whose final fall grades will not be available before the beginning of Winter Quarter at UCD.

†An applicant seeking admission to the Spring Quarter may not enroll in any school for the Spring Semester immediately preceding the UCD Spring Quarter.

Delays in notification can be avoided if you complete the application accurately, include your essay and filing fee, and arrange for official transcripts (including course work in progress) and official test scores and other supporting documents to be sent to the Under-

graduate Admissions Office as soon as they are available. High school students should not forward transcripts unless requested by the Undergraduate Admissions Office. Because advanced standing eligibility depends upon the final outcome of quarter or semester course work in progress, this office must receive a final official transcript of all work completed before you may register.

**Transcripts and Test Scores**

Transcripts and other documents submitted during the application process become the property of the University and cannot be returned or forwarded to another institution or UC campus. Please note that it is your responsibility to arrange for official transcripts to be forwarded and to ensure that they arrive promptly. It is also useful to have unofficial transcripts sent to you to retain for counseling purposes.

You must submit an official final transcript including a statement of graduation, a Certificate of Proficiency or a General Education Development (GED) certificate. Freshman applicants (see "Explanation of Application Categories") are also required to submit official results of their SAT or ACT tests and three Achievement Tests. (Fall quarter freshman applicants must complete all tests by the December test date in order to be given priority in the admissions process.)

If you have attended or are attending another college when you apply, you must have final official transcripts of all college-level work, as well as your high school transcript, sent directly to the Undergraduate Admissions Office.

**Addition of Campus Choice**

If, after submitting your application, you wish to add a campus or campuses to those listed on your application, you may do so for a fee, if the campus(es) you

**Admission** wish to add is (are) still open to new applications. Contact the Admissions Office at the new campus(es) for their application status. If your application can be included, submit a request to the Undergraduate Application Processing Service in writing, stating your full name, social security number, application ID number, college, major, and term for entrance, and include the additional application fee and your signature.

Processing an addition of campus choice takes several weeks; however, your admission priority will be assigned based on the date your request for an addition is made. You should be aware that special program commitments, such as the EOP/SAA or UCLA's Academic Advancement Program, may vary from campus to campus.

If you desire housing or financial aid information, you should contact the "added" campus housing and financial aid offices about the campus's priorities, deadlines, and availability of financial aid and housing.

#### **Notification**

After submitting your application materials you may be wondering,

- Has the University received my application forms?
- Will I be considered for admission at my preferred campus?
- Will I be admitted to the University?

The University will mail you a notice acknowledging receipt of your application; upon completion of a review of your academic records, you will be notified of your admission status.

The length of time before admission notification varies, depending upon the completeness of your application. For example, most applicants for fall

quarter will be notified of their admission status between February 1 and mid-March. The Statement of Intent to Register should be returned by May 1 (as a freshman) or June 1 (as a transfer) to notify the campus that you wish to attend. Students not selected for admission consideration at the UC campuses to which they have applied may have their application considered at another UC campus where space is still available.

#### **Acceptance of Admission**

When you receive your notification of admission you will also receive an important form called the "Statement of Intent to Register" (SIR). You must complete the form and return it to this office, along with the required nonrefundable \$100 deposit, in order to complete the admissions process. This advance deposit is applied to your University Registration Fee as long as you register in the quarter to which you are admitted. Intercampus transfer, EOP, and readmission applicants (see Explanation of Application Categories below) are not required to submit the \$100 advance deposit; however, they will pay full Registration fees at the time of registration.

### **EXPLANATION OF APPLICATION CATEGORIES**

An **undergraduate** applicant is a student who wishes to complete a program of studies leading to a Bachelor of Arts (A.B.) or Bachelor of Science (B.S.) degree.

A **freshman** applicant is a student who has graduated from high school or who has earned a Certificate of Proficiency or a General Education Development Certificate, but has not enrolled since high school attendance in a regular session of any collegiate-level institution (with the exception of summer session



attendance immediately following high school graduation).

An **advanced standing (transfer)** applicant is a student who has been registered in a regular or extension session of a college or university since high school graduation.

An **intercampus transfer** applicant is an undergraduate student who is currently, or was previously, registered in a regular session at another campus of the University of California and has not since been registered in another (non-UC) collegiate institution.

An **intercampus transfer reentrant** applicant is an undergraduate who was formerly registered at UC Davis, then registered at another UC campus, and is now transferring back to UC Davis from a UC campus. This student follows the filing deadlines established for readmission applicants and applies as a readmit through the Davis campus Office of the Registrar.

An **Educational Opportunity Program/Student Affirmative Action** applicant is a low-income, disadvantaged, or underrepresented student who may or may not meet the standard admission requirements for freshman or advanced standing status.

A **readmission** applicant is a student who was formerly registered on the Davis campus, who has interrupted the completion of consecutive quarters of enrollment and who is not currently participating in the Planned Educational Leave Program.

A **reentry** applicant is an undergraduate student age 25 or over or a graduate student age 30 or over who has had a significant break in education.

A **limited status** applicant is a college graduate (or near-graduate) who is not a candidate for an advanced degree, but who has the limited objective of enrolling in certain courses on the Davis campus.

A **special status** applicant is any person 21 years of age or older who is prepared, by reason of special attainment or background, to undertake limited course work toward a specific objective.

A **part-time status** student is a person who wishes to complete a degree at UC Davis on a part-time enrollment basis.

**Employee-student status** is for a UC career employee who wishes to work toward a degree through the Employee Reduced Fee Program.

A **second baccalaureate** applicant is a college graduate who seeks an additional bachelor's degree. Approval is granted only to students who have completely changed their educational objectives and are applying for a major that has no enrollment restrictions.

An **international** applicant is a student who is not a U.S. citizen, immigrant, or refugee.

A **concurrent enrollment** applicant is someone who wishes to fulfill an academic interest or to test academic ability by enrolling in a limited number of regular University courses on a space-available basis. Such work may be used for admission consideration and for later meeting degree requirements. A concurrent student is enrolled but not admitted to UC Davis.

This program is offered through University Extension and does not require the applicant to meet regular admission requirements.

A **graduate** applicant is a college graduate who wishes to complete a program of studies leading to an advanced degree, i.e., the master's or doctorate. See the Graduate Division section in this catalog.

A **professional school** applicant is a student who has completed the requirements necessary for admission to one of the professional schools on the Davis campus (Law, Management, Medicine, Veterinary Medicine). Please see the appropriate sections in this catalog for specific information.

## UNDERGRADUATE STUDIES

Undergraduate studies at the University of California, Davis, are divided into three colleges: Letters and Science, Agricultural and Environmental Sciences, and Engineering. When you apply for admission to Davis, you make an application to one of these colleges. The three colleges differ in their educational focuses and in the major programs they offer.

The **College of Agricultural and Environmental Sciences** focuses on seven areas of concentration: animal science; plant sciences and pest and disease management; food, nutrition, textile, and consumer sciences; applied economic and behavioral sciences; resource sciences and engineering; environmental studies; and biological sciences. The **College of Engineering** focuses its curricula on the engineering sciences. The **College of Letters and Science** curricula encompass the humanities, including the arts, and the social, physical, and biological sciences. They enable the student to pursue fundamental knowledge and to learn those basic intellectual disciplines which lead to a liberal education.

Major programs are listed in each college section.

## ENTRANCE REQUIREMENTS

The University's undergraduate admission requirements are based on two principles:

- The best predictor of success in the University is high scholarship in previous academic work, and
- The study of certain subjects in high school gives you a good preparation for University work and reasonable freedom in choosing a specialized area of study.

Undergraduate entrance requirements are based upon these general principles but may vary in specific details, depending upon the type of admission you are seeking. If you are planning to apply as an advanced standing student it is important to remember that your high school record will form part of the basis for our evaluation of your qualifications and therefore an official copy of it must be submitted. Listed below are the requirements for all undergraduate admission categories.

## ADMISSION AS A FRESHMAN

To be eligible for admission to the University of California as a freshman, you must meet specific **Subject, Scholarship, and Examination Requirements**.

## Subject Requirement

You must complete at least 15 high school units in the subject areas listed below. At least 7 of the required 15 units will have to be taken in the last two years of high school. The required course sequence is often referred to as the "A to F" pattern.

Courses taken in the ninth grade and completed with a grade of C or better can satisfy a subject requirement, however, the grades will not be used in computing your grade-point average. If you receive a grade of D or lower in a ninth-grade course, you have not satisfactorily completed the subject requirement until you repeat the course (or, in some cases, complete a more advanced course) with a grade of C or better.

(Note: A year course in high school constitutes one unit.)

### A. History—1 unit

One year of United States history, or one-half year of United States history and one-half year of civics or American government.

### B. English—4 units

Four years of English—composition and literature (university preparatory in nature, including frequent and regular practice in writing expository prose compositions of some length). Not more than one year will be accepted from the ninth grade. (See English Proficiency below.)

### C. Mathematics—3 units

Three years of mathematics—elementary algebra, geometry, and intermediate algebra. (Courses taken in grades seven and eight may partially satisfy the requirement if they are accepted by the high school as equivalent to its own courses.)

### D. Laboratory Science—1 unit

A year course in one laboratory science, taken in the tenth, eleventh, or twelfth grade.

### E. Foreign Language—2 units

Two years of one foreign language. Any foreign language with a written literature and emphasis on the development of aural and oral skills may be used. (Courses taken in grades seven and eight may satisfy this requirement if they are accepted by the high school as equivalent to its own courses.)

### F. College Preparatory Electives—4 units

Four units in addition to those required in "A" through "E" above, to be chosen from at least two of the following subject areas. Elective courses should involve considerable reading and aim to develop analytical and reasoning ability and skill with written and oral exposition.

- **History and English** courses that fit the general description for elective courses above.
- **Advanced mathematics:** Trigonometry, linear algebra, precalculus (mathematical analysis), calculus, statistics, computer science, and similar courses. (Courses containing significant amounts of material for arithmetic or from shop, consumer, or business mathematics are not acceptable.)

- **Laboratory science:** courses in the biological and physical sciences. A general science course taken in grade nine as preparation for a laboratory science may be used.

- **Foreign language:** courses may be in either the same language used to satisfy the "E" requirement or a second foreign language. If a second language is chosen, however, at least two years of work in that language must be completed.

- **Social science:** courses that fit the general description for elective courses above, and that serve as preparation for lower division work in social science at the University. (Courses of an applied, service, or vocational nature are not acceptable.)

- **Visual and performing arts:** courses should enable students to understand and appreciate artistic expression, and to talk and write with discrimination about artistic materials studied. Courses that develop creative artistic ability or artistic performance may be used. (Courses that are recreational or are offered under physical education are not acceptable.)

If you are a California high school graduate, the courses used to satisfy the **Subject Requirement** must appear on a list that your high school principal has certified meets the course descriptions above, and has placed on file with the University's Office of Student Academic Services. If you submit courses from an out-of-state school, the Undergraduate Admissions Office will determine if your courses are acceptable in fulfillment of the Subject Requirement.

## English Proficiency

Instead of a fourth year of high school English, you may satisfy the **English Proficiency Requirement** by completing one of the following:

- College Board Achievement Test in English Composition (a score of 600 or above);
- Advanced Placement Examination in English Composition and Literature or English Language and Composition (a score of 5, 4, 3); or
- California State University and Colleges English Equivalency Test (a "pass for credit" only).

The requirement may also be satisfied with a 3-semester or 4-quarter unit transferable college-level English course with a grade of C or higher in literature, composition, or speech.

## Scholarship Requirement

An applicant must have earned a grade of C or better in all high school courses to satisfy the "A" through "E" requirements above. The grades earned in these courses that are taken in grades ten through twelve will be used to compute the grade-point average for admission, *except that* the grades earned in the third year of mathematics required under the "C" requirement (intermediate algebra) will be used only if they improve the applicant's grade-point average.

Two of the four units in elective courses used to satisfy the "F" requirement must be completed with a grade of C or better, and all four units must be accepted by the high school for graduation. The best grades

earned in any two of these units taken in grades ten through twelve will be used in computing the applicant's grade-point average for admission.

If you attain a grade-point average of 3.30 (where the letter grade A=4, B=3, and C=2, and in honors or advanced placement courses taken during the eleventh and twelfth years—limit of four year-long courses—where the letter grade A=5, B=4, and C=3) in the required "A to F" subjects taken after the ninth grade, you will be eligible to enter the University regardless of your scores on standardized tests. If your grade-point average falls below 3.30 but higher than 2.77, you will be eligible for the University by achieving the specified scores on the standardized tests (see the Eligibility Index on the following page). If you are a nonresident applicant, your grade-point average in the required subjects must be 3.40 or higher.

In determining the required grade-point average, the University will use a semester grade of A in one course to balance a semester grade of C in another. Grades you received in courses taken in the ninth grade or earlier are not used in determining your grade-point average. (However, these courses may be used to satisfy subject requirements.) The grades that appear on your official high school transcript, including those earned in accelerated and advanced courses, are the grades the University will use in evaluating your record. Grades are counted on a semester basis unless your school gives only year grades.

To meet the **Subject and Scholarship Requirements** you may repeat courses in which you received a grade of D or lower. The grade achieved in the repeated course will be calculated into the grade-point average. There is no limit to the number of repeated courses that may be used in the "A to F" pattern, but each course may be repeated only one time.

### **Examination Requirement**

All freshman applicants must submit scores from the College Board or the American College Testing (ACT) Program. If you are applying for admission to the fall quarter, you should take the tests no later than December of your senior year (earlier testing is recommended). The following tests are required:

- Scholastic Aptitude Test (College Board)—The verbal and mathematics tests scores you submit must be from the same sitting

**or**

- American College Test

**and**

- Three Achievement Tests (College Board), which must include (a) English Composition (with or without the essay), (b) mathematics (level I or II), and (c) one test from the social studies or science or foreign language, or the test in English literature.

If you are a California resident and your grade-point average in the required high school subjects is over 3.30, the tests are required but your scores will not be used to determine your eligibility.

The accompanying table is an eligibility index. If your grade-point average in the "A to F" requirement is less

than 3.30 you should refer to this table to see what examination scores you must earn to be eligible for University admission.

### **Eligibility Index**

<b>Grade Point Averages A-F Requirement</b>	<b>SAT† Total Scores</b>	<b>ACT* Composite Scores</b>
2.78	1600	36
2.79	1580	36
2.80	1550	35
2.81	1530	35
2.82	1510	34
2.83	1480	34
2.84	1460	34
2.85	1440	33
2.86	1410	33
2.87	1390	33
2.88	1370	32
2.89	1340	32
2.90	1320	31
2.91	1300	31
2.92	1270	30
2.93	1250	30
2.94	1230	29
2.95	1200	29
2.96	1180	28
2.97	1160	28
2.98	1130	27
2.99	1110	27
3.00	1090	26
3.01	1060	26
3.02	1040	25
3.03	1020	25
3.04	990	24
3.05	970	23
3.06	950	22
3.07	920	22
3.08	900	21
3.09	880	21
3.10	850	20
3.11	830	20
3.12	810	19
3.13	730	19
3.14	760	18
3.15	740	17
3.16	710	17
3.17	690	17
3.18	670	16
3.19	640	15
3.20	620	14
3.21	600	14
3.22	570	14
3.23	550	13
3.24	530	13
3.25	500	12
3.26	480	12
3.27	460	11
3.28	430	11
3.29	410	11
3.30	400	11

\*The American College Test (ACT) is scored in intervals of 1 point from a minimum of 1 to a maximum of 36.

†The Scholastic Aptitude Test (SAT) is scored in intervals of 10 points from a minimum of 400 to a maximum of 1600.



### Admission by Examination Alone

If you do not meet the scholarship and subject requirements for admission and have completed fewer than 12 quarter or semester units of transferable college work since high school graduation, you can qualify for admission as a freshman by examination alone. (If you have completed transferable college courses, College Board tests cannot be taken in academic subjects covered in those courses.) You must take the same College Board tests discussed above and receive a total score of at least 1100 on the Scholastic Aptitude Test, or a score of 26 on the American College Test. Your total score on the three Achievement Tests must be 1650 or higher with no score less than 500 on an individual Achievement Test. If you are a nonresident applicant, your score on the three Achievement Tests must be 1730 or higher.

**Examination Arrangements:** Make arrangements to take the required Scholastic Aptitude Test (SAT) and the Achievement Tests by writing to The College Board, 1947 Center Street, Berkeley, CA 94704. For the American College Test (ACT) write to American College Testing Program, Registration Unit, P.O. Box 168, Iowa City, IA 52240. (Test fees should be paid to the Testing Service, not the University.) UC Davis's College Board code is 4834 and the ACT code is 0454.

### ADMISSION TO ADVANCED STANDING

An advanced standing transfer applicant is a student who has been registered in a regular or extension session of a college or university since high school graduation, excluding the summer immediately following high school graduation. An advanced standing student may not disregard his or her previous college records. Official transcripts from all previous colleges

or universities must be submitted to Undergraduate Admissions. This Office determines an applicant's status by looking at courses that are transferable to the University. Courses accepted for admission may not be accepted by the Dean of your college for meeting breadth, major, General Education, or degree requirements.

### Admission Requirements

The requirements for admission to advanced standing will vary according to your high school record. If you have fewer than 84 transferable quarter (56 semester) units, you may be required to submit a SAT examination score to establish your high school eligibility on the eligibility index. Transfers with more than 12 quarter or semester units are not required to submit achievement test results. In any case, if you have completed fewer than 12 units since high school graduation, the examination requirements for freshman applicants also apply. If you are a nonresident, you need to meet the additional requirements as described later in this section under Nonresident Applicants.

The transcript you submit from the last college you attended must show, as a minimum, that you were in good standing and that you had earned a grade-point average of 2.00 or better. If your grade-point average fell below 2.00 at any one college you attended or you are not in good standing, you may have to meet additional requirements in order to qualify for admission.

As an advanced standing applicant you must also meet one of the following conditions:

- If you were eligible for admission to the University when you graduated from high school—meaning you satisfied the Subject, Scholarship, and Examination Requirements—you are eligible to transfer if you have a C (2.0) average in your transferable college course work.

If you have completed fewer than 12 quarter or semester units of transferable college credit since high school graduation, you must also satisfy the examination requirement for freshmen. Beginning fall 1989, all transfer students, regardless of the date of high school graduation, must meet the high school requirements stated earlier in this catalog, or establish eligibility as junior-level transfers.

- If you have graduated from high school and meet the needed Eligibility Index score but you have not completed one or more of the "A to F" subjects while in high school, you may be admitted after you have:

1. established an overall grade-point average of 2.00 or better in another college or university;
  2. completed with a grade of C or better appropriate college courses in the high school subjects that you lack; and
  3. completed 12 or more transferable quarter (or semester) units, or have met the freshman examination requirement.
- If you did not meet the needed Eligibility Index score and lack the required subjects, you may be admitted after you have:

1. established an overall grade-point average of 2.40 or better in another college or university;
2. completed 84 transferable quarter (56 semester) units of credit in college courses; and
3. completed one of the following:

a. appropriate college courses, with a grade of C or better, in high school subjects that you lacked—up to two units (one unit = one year-long course) of credit may be waived except in English and mathematics;

or

b. a college course, or courses, in mathematics; one in English; and one in either U.S. history, a laboratory science, or a foreign language, all with grades of C or better. The mathematics component must at least be equal to algebra, geometry, and advanced algebra. A course for which advanced algebra is a prerequisite, including statistics, will satisfy the entire requirement. Courses on the application of statistics to particular disciplines (i.e., business statistics) may not be used to satisfy this requirement. Courses other than mathematics must be transferable to the University.

## CAMPUS SELECTION CRITERIA

UC Davis makes every effort to provide a place for all California resident applicants who meet the minimum admission requirements and file an application during the appropriate priority filing period.

In recent years, the number of applicants for some majors has far exceeded the number of spaces available. When UC Davis cannot accept all eligible applicants, it uses standards which are more demanding than the minimum requirements to select students. These standards, which are called selection criteria, identify those students who have demonstrated the capacity for high academic achievement and who have a variety of other qualities that can contribute to the strength and diversity of the campus community.

The selection criteria for freshman and transfer applicants for fall 1990 are described in this section. In the paragraphs following are the standards used by UC Davis to develop the selection procedures.

The selection criteria described below are only for applicants for the fall 1990 term. The criteria may differ for the winter and spring terms because enrollment targets and applicant qualifications change. Applicants for winter or spring should contact the Undergraduate Admissions Office for more information.

### Freshman Applicants

All freshman applicants are ranked using an academic index based upon the following components: the high school grade-point average, which is calculated on all academic courses completed in the subject areas specified in the University's eligibility requirements (the a-f subjects); scores on required tests—the Scholastic Aptitude Test or the American College Test, and the College Board Achievement Tests; and the number and content of courses successfully completed in academic subjects beyond the minimum specified in the University's eligibility requirements.

University-approved accelerated, Advanced Placement, and honor courses are considered in the context of the overall GPA. The index consists of the sum of 1,000 times the high school grade-point average (capped at 4.00), plus the SAT Verbal and SAT Math scores (maximum 800 points each), plus the three required College Board Achievement test scores (maximum 800 points each), plus 50 points for each academic course successfully completed beyond the minimum specified in the university's eligibility requirements (maximum 800 points). Freshman applicants are assigned a selection score derived from the following formula:

$$(1,000 \times \text{GPA} [\text{capped at } 4.00]) + (\text{SAT Verbal}) + (\text{SAT Math}) + (\text{three Achievement scores}) + (50 \times \text{Number of additional A-F courses})$$

The maximum selection score of 8,800 is derived as follows:

$$(1,000 \times 4.0) + (800) + (800) + (800) + (800) + (800) = 8,800$$

**Academic Criteria.** Academic criteria are used to select 60 percent of admitted students. Applicants are selected on the basis of the score achieved in the academic index described above.

**Supplemental Criteria.** Supplemental criteria are used to select 40 percent of admitted students. The academic index is used as the basis for selection, with consideration of additional factors, including intended major, strength and range of college preparatory courses, personal accomplishments and qualities, special circumstances, ethnic identity, gender, and location of residence.

### Advanced Standing Applicants

**Academic Criteria.** The admission of advanced standing applicants is based on completion of aca-





demic course work, level at entry, and the type of college/university from which they transfer. Davis administers a Transfer Admission Agreement (TAA) that provides priority admission for upper division transfers from 40 California community colleges. In addition to the TAA group, all other eligible junior level transfers from other California community colleges are given highest priority for admission. The following groups are then considered in priority order: upper division transfers from other University of California campuses, and from other four-year California and non-California institutions. If space permits, lower division transfers from other four-year California institutions are admitted if they have superior grades.

**Supplemental Criteria.** The same supplemental criteria described above for freshman applicants are used.

#### **SPECIAL PROGRAMS AND ADMISSIONS CATEGORIES**

##### **Educational Opportunity Program/Student Affirmative Action (EOP/SAA)**

The Educational Opportunity Program/Student Affirmative Action is designed to assist and provide opportunities in higher education for students from underrepresented ethnic groups (American Indian, Black, Chicano, and Latino), students with a disability, and students from economically and/or educationally disadvantaged backgrounds. The program offers assistance with the admission application process in addition to providing academic, social and cultural support. (See also under Advising and Counseling in the Student Life section.) An admissions application fee waiver and financial aid are available to those individuals with demonstrated financial need. You can contact the Undergraduate Admissions Office for information on obtaining the fee waiver.

An EOP/SAA applicant may be admitted in one of these two ways: (1) as a freshman or advanced standing student who has met the standard admission requirements, or (2) as a special-action freshman or advanced standing student who has not met the admission requirements but who has demonstrated academic potential.

To apply for the program, each applicant must complete the regular UC admission application form and complete the appropriate places related to EOP. In addition, the applicant is advised to discuss the reasons for requesting EOP assistance in the required essay.

##### **Academic Reentry Program**

The Academic Reentry Program gives assistance in applying to the University to students in nontraditional age categories who are reentering the University after life and work experience. Preadmission and reentry advising provides assistance in combining past study with current academic and career goals. A reentry student who has not met the entrance requirements but has demonstrated recent academic potential, has special talents, or a disadvantaged educational history may be considered for admission by special action. (See also under Advising and Counseling in the Student Life section.)

##### **Second Baccalaureate Status**

If you have a bachelor's degree substantially equivalent to one that is granted by the University of California, you may be allowed to enroll as an undergraduate seeking a second bachelor's degree. Admission in this category will depend upon a superior academic record and clear evidence of a change in objective.

Admission to the College of Agricultural and Environmental Sciences requires the approval of the Admissions Officer and the Dean of the college.

*Enrollment pressures have necessitated closing this category of admission for the Colleges of Engineering and Letters and Science.*

### **Limited Status**

Students in limited status are those whose special attainments qualify them to take certain courses in the University toward a definite and limited objective. To apply for limited status admission you must either have a bachelor's degree but not be a candidate for an advanced degree, or have completed a substantial amount of college work with a satisfactory grade-point average. You will not be admitted to limited status for the purpose of raising a low scholarship average.

As a limited status student you will be expected to maintain a certain scholarship average during a pre-determined time of enrollment.

Admission to the College of Agricultural and Environmental Sciences requires the approval of the Admissions Officer and the dean of the college. You must also submit transcripts from all schools attended. Fees and filing dates are the same as those for new applicants.

*Enrollment pressures have necessitated closing this category of admission for the Colleges of Engineering and Letters and Science.*

### **Special Status**

The special status classification is designed for applicants 21 years of age or older who have not had the opportunity to complete a satisfactory high school program or who have not completed a substantial amount of college work, but by reason of special attainment or background may be prepared to undertake certain courses at UC Davis toward a definite and limited objective.

You will not be admitted to special status for the purpose of fulfilling requirements for admission as a regular student. Conditions for admission are determined by the Admissions Officer and are subject to approval by the dean of the college in which you plan to enroll. Admission is for a specified time only and a prescribed scholarship average must be maintained. Fees and filing dates are the same as those for new applicants.

*Enrollment pressures have necessitated closing this category of admission for the Colleges of Engineering and Letters and Science.*

### **Nonresident Applicants**

A nonresident applicant for advanced standing who meets the admission requirements for freshman admission must have a grade-point average of 2.8 or higher in college courses that are accepted by the University for transfer credit.

If you lack any of the required high school subjects, and are a nonresident, you must complete college courses in those subjects with a grade of C or higher. If you graduated from high school with less than a 3.4 grade-point average in the subjects required for freshman admission you must have completed at least 84 quarter units (56 semester units) of transferable work with a grade-point average of 2.8 or higher. Upon successful completion of that work, you may have the

requirement for two units of the required high school subjects waived.

Admission 55

### **Intercampus Transfer Status**

If you are currently registered as an undergraduate student or have been registered on another campus of the University of California, and have not subsequently registered at another institution, you may apply for an intercampus transfer to UC Davis. Applications are available from any local high school, community college or UC campus. The nonrefundable application fee must be submitted with your transfer application. Filing dates are the same as those listed for regular applicants (see Calendar at the front of this catalog).

### **International Student Status**

Applicants from other countries will be admitted in accordance with the general procedures governing nonresident admission. An **international** application may be obtained by writing the Undergraduate Admissions Office, 175 Mrak Hall, University of California, Davis, California, 95616. Applicants who are not United States citizens, immigrants, or refugees, must return this application with the nonrefundable application filing fee. It is very important that the application be filed during the appropriate filing period. Applications received after the first month of the priority filing period will be processed as space permits.

Prior to admission, the Financial Certification Form is required to demonstrate the availability of \$17,500 for the first year's study. Adequate funding is required for the remaining years in the United States until the academic program is completed. Prior to registration, the signed Statement of Responsibilities for Privately-Funded Students, or the Statement of Responsibilities for Sponsored Students is required.

For applicants whose native language is not English or whose schooling has not been in the English language, the results of the Test of English as a Foreign Language (TOEFL) are required and must be submitted. To arrange a testing date and location in one's home country write to the Educational Testing Service, P.O. Box 899, Princeton, New Jersey, 08540. The minimum TOEFL score which will be accepted is 500.

Prior to registration, international students whose native language is not English are required to demonstrate sufficient command of the English language to profit from instruction at the University. A proficiency examination is given at UC Davis during the week before school begins. If students do not pass this examination, they must enroll in English classes for international students—English 21, 22, or 23—until they have acquired the necessary language skills. In addition, students must satisfy the University Subject A requirement.

As part of the application process, applicants are required to submit their secondary school and college records (English translations must accompany all records). These records should include all certificates and transcripts of grades awarded in each subject. Credit will be granted for university studies outside the United States if the course work has been completed in an approved university and is considered to be academically equivalent to course work offered at the

**Admission** University of California. The Undergraduate Admissions Office will have the final authority for assessing the transferability of credit.

For additional information, look under International Student Services in the Student Life section of this catalog.

### **Part-Time Status**

If, for reasons of occupation, family responsibility, health, or, *for one time only*, graduating senior status, you are unable to attend the university on a full-time basis, you may qualify for enrollment in part-time status. Students may change status between full-time and part-time as their circumstances change. To be considered eligible, undergraduate students must be enrolled for ten units or fewer per quarter. Minimum progress requirements are waived for part-time students. A petition, available at the Office of the Registrar, must be approved by the dean of your college (certain verifications are required), and then filed with the Office of the Registrar no later than the tenth day of instruction in the quarter of enrollment. Part-time students have use of the same facilities and are eligible for the same services, including Student Health Services, as full-time students. For information on fee reductions applicable to part-time students, see the Fees and Expenses section of this catalog.

### **Employee-Student Status**

Reduced fees are available to UC career employees and certain UC retirees who are qualified for admission to the University. Once admission has been granted, a petition for the reduction in fees must be filed prior to each quarter of enrollment. Employee students pay one-third of the regular fees and may enroll for up to nine units or three courses per quarter/semester, whichever is greater. Detailed information is in the UC Staff Personnel Policy Manual (Section 260.23 for employees, 775.7 for retirees, and 141.11 for the Administrative and Professional Staff program) available in department offices, at the Library Reference Center, or the Staff Development and Professional Services Office. Petitions can be obtained through the employee's unit.

### **Concurrent Enrollment Status**

Concurrent courses are regular University courses open to the community on a space-available basis. The purpose of the program is to allow an individual to pursue academic interests and to test academic abilities at the University.

For information, write the University Extension Office, 1333 Research Park Drive, Davis, CA 95616 or call 916-757-8777.

**For admission to the Graduate Division, Schools of Law, Graduate School of Management, Medicine, or Veterinary Medicine**, see the appropriate sections in this catalog.

## **ADDITIONAL INFORMATION**

### **Options for Nontraditional Students**

While UCD graduate and undergraduate degree programs are designed primarily for students who can enroll full time on campus, the following programs make it possible for qualified nontraditional students

to accumulate credit without enrolling full time:

- For students admitted to UCD:

Part-time status

Employee-student status

Credit by examination

- For admitted and non-admitted UCD students:

University Extension courses

Summer Sessions courses

- For students who have not been admitted to UCD:

Concurrent courses

Preadmission advising is available to nontraditional students through the Academic Reentry Program.

### **High School Proficiency Examination**

The University of California will accept the Certificate of Proficiency or the General Education Development (GED) certificate awarded by the State Department of Education, in lieu of the regular high school diploma. However, you must also meet all other University entrance requirements (subject, scholarship, examination). On University records, the date of graduation will be the date of the certificate. Admission by College Board test scores alone is still an option if you were ineligible on the basis of your high school record.

### **Advanced Placement Examinations**

The Advanced Placement Examinations of the College Board are taken in conjunction with courses taken in high school. Depending on the examination, you can receive 8 or 4 quarter units of University credit for each examination in which you earn a score of 5, 4, or 3. These credits will apply toward the total required for graduation from the University. See the table on examination advanced placement for course work equivalencies and limitations of credit.

### **Credit from Another Institution**

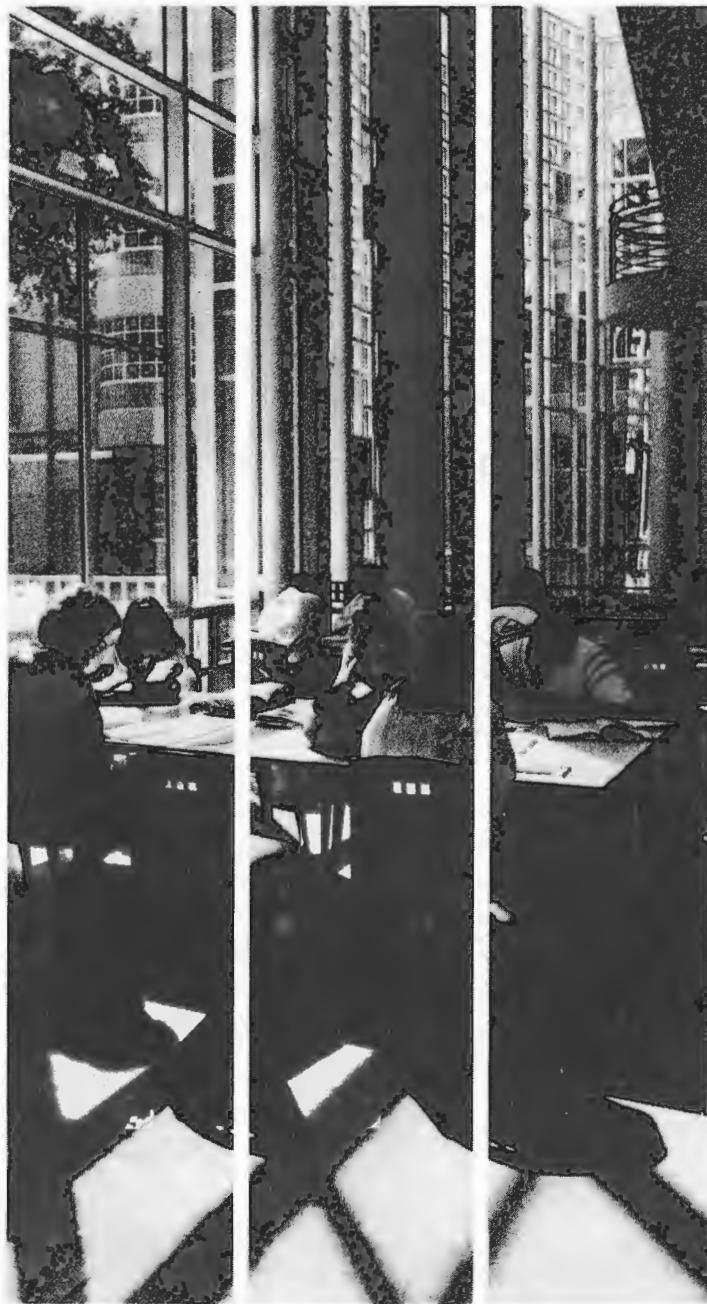
The University gives unit credit to transfer students for courses they have taken at other accredited colleges and universities, including some extension courses. To be accepted for credit, the courses must be consistent with those at the University as determined by the Admissions Office. (Students accepted into the College of Agricultural and Environmental Sciences should refer to that section in regard to petitioning for upper-division courses evaluation.)

California community colleges offer a full program of courses approved for transfer credit. A maximum of 105 quarter units (70 semester units) may be earned toward a University degree at a community college. Subject credit for transferable courses in excess of these units may also be granted to meet University graduation requirements.

Applicants to the College of Agricultural and Environmental Sciences and to the College of Letters and Science who have more than 120 quarter (80 semester) units of credit for transfer must have the approval of the Dean of the College and satisfy University requirements for admission. (College of Engineering applicants should refer to the Engineering section.)

# Academic Information

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## WHEN YOU ARRIVE

Information:  
Summer Advising/Orientation Programs  
Advising Services  
South Hall  
752-3000

Starting off on the right foot at UCD is made a little easier by various programs designed to introduce you to the University.

The Summer Advising and Registration Program is a chance for entering students, both freshmen and transfers, to visit the campus for two or three days during the summer. If you are a freshman, your parents are also invited to attend, and a special parents' program is planned for them. During this program you will have a chance to become familiar with the campus, learn about the services available to students such as financial aid and student advising, take required course placement exams and complete your registration (payment of fees) and enrollment in classes. You will also be able to meet students, professors, and staff members and get some advice about majors, requirements, social life, and answers to questions you or your parents may have. It's a good way to start out, and Davis won't seem like such a strange new place in the fall.

Orientation Week, held at the beginning of each fall quarter, offers new and continuing students a variety of activities, special events, and meetings to get the new quarter started. Some of the things that happen include departmental open houses, tours of the campus, concerts and lectures, registration, enrollment, and meetings with deans and advisers. Orientation activities are also held for students entering in winter and spring quarters.

## REGISTRATION PROCEDURES

Information:  
Office of the Registrar  
124 Mrak Hall  
916-752-2973

Registration is the means by which you become a student at the University. The registration process includes paying fees, enrolling in classes, and completing and filing informational forms. Every UCD student must register each quarter.

If you are a *new* or *reentering* student you must also:

- Have a photo ID picture taken.
- Submit a Statement of Legal Residence (see Appendix).
- Return the completed Medical History form, evidence of rubella immunity, results of a tuberculin skin test, and the Insurance Information Request

form. These forms are mailed to each new student from the Student Health Center.

*New graduate students who have been registered previously at Davis as undergraduates are considered to be new students.*

Your registration is complete when you have submitted your registration forms, had your photo taken (first term of enrollment only), paid your fees, and enrolled in classes. Late registration privileges extend through the tenth day of instruction, but you will be assessed a fee of \$50 to defray the extra clerical costs of late registration. Permission to register after the deadline will be allowed only under conditions where action or inaction on the part of the University delays registration. A recommendation from an appropriate administrative unit will be required, and the registration fee must be paid with cash, cashier's check, credit union check, university check, or fee exchange.

If you have not satisfied the Subject A requirement, you must enroll in English A. Consult the current *Class Schedule and Room Directory* (published about seven weeks before the beginning of the quarter and available in the campus bookstore) for more detailed information.

### Study List Unit Limitations

Undergraduate students must carry a study load of at least 12 units each quarter in order to be certified as full-time students for insurance and financial aid purposes, or to compete in intercollegiate athletics. The expected study load for graduate students is 12 units per quarter, but 8 units will maintain full-time status.

Undergraduate students who qualify for part-time status may enroll for ten units or fewer per quarter; and graduate students with part-time status may enroll for one-half course load. Employee-students may enroll for up to nine units or three courses, whichever is greater, any given quarter.

Normally, an undergraduate student enrolls for 15 units per quarter; however, you should familiarize yourself with the quarterly minimum-progress requirements. Undergraduate students should refer to College sections for quarterly maximum-unit allowances.

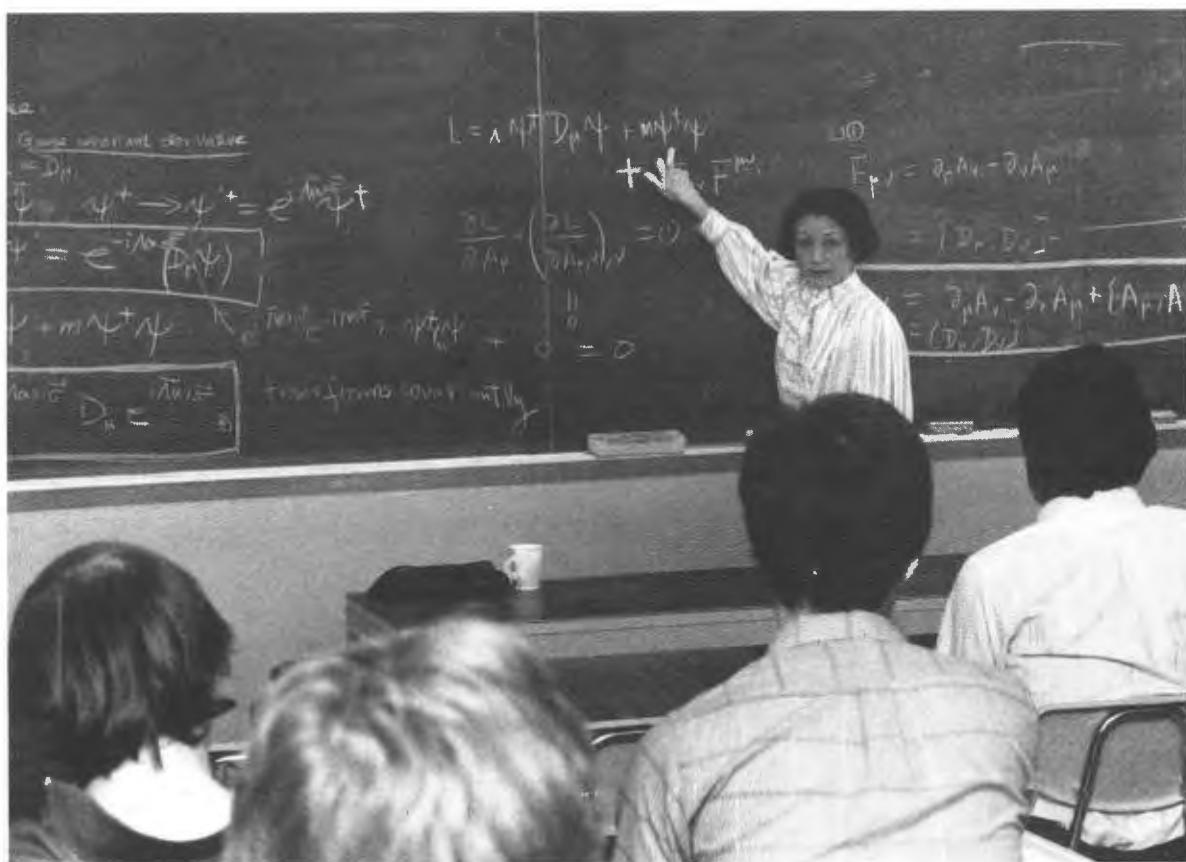
### Variable-Unit Courses

Subject to approval by the department chairperson, an instructor may arrange to give a special study course (numbers 92, 97T, 97TC, 98, 99, 192, 194H, 197T, 197TC, 198, 199) to interested students. These courses are graded on a Passed/Not Passed basis only. Under special circumstances, an instructor may request from the Academic Senate Committee on Courses of Instruction approval to award letter grades

### Deadlines

	FALL 1990	WINTER 1991	SPRING 1991	FALL 1991
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Filing period for students who expect to complete work for bachelor's degree to file an Announcement of Candidacy with the Registrar	May 25-Sept. 14	Nov. 12-Dec. 17 (1990)	Feb. 6-March 22	May 20-June 24 (for Sept. '91)
Deadline for students who plan to complete work for a minor program to file applications with their Dean's Office	Oct. 10	Jan. 18	April 12	July 8 (for Sept. '91)



(except 92, 192 courses). The request must be submitted by the instructor within the first ten days of instruction of the quarter in which the course is offered. Such requests, however, are not automatically approved.

Credit in *Special Study Courses* (numbered 99, 194H, 199) is limited to a total of 5 units per term.

#### Adding or Dropping Courses

You are officially enrolled in all courses listed on your individual study list and will be held responsible for completing each of the courses. You must file an Add-Drop petition in order to add or drop courses after this initial enrollment. Petitions are to be filed with the departments offering courses to be added or dropped.

See the Academic Calendar in the front of this catalog for final dates for filing petitions each quarter, and refer to the appropriate *Class Schedule and Room Directory* for filing procedures. **After published deadlines** permission to change your study list may only be granted by the dean of your college or school and only in special circumstances. Graduate students must have their adviser's approval in order to drop courses. A course which is on your study list and for which you did no gradable work is reflected on your official transcript. A verification of your study list is available at the beginning of the fifth week of each quarter.

#### Changes of Major, College, or School

With the approval of the appropriate dean or deans, an undergraduate student in good standing can transfer from one area of study to another. Petitions for this purpose may be obtained from the Office of the Reg-

istrar (Letters and Science major change petitions are obtained from department offices).

Petitions for a change of college must be filed in the first five weeks of the quarter. Requirements for changing a major in a given college are listed under each college section in this catalog.

#### Change of Name

Petitions for this purpose may be obtained from the Office of the Registrar. (Students planning to graduate should file this petition no later than the fifth week of the quarter in which they intend to graduate.)

### INDEPENDENT STUDY PROGRAM

Information:  
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 their 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 end of the second week of the term prior to the term in which the project is to be undertaken. (See the Academic Calendar at the front of the catalog for specific dates.)

You must report the completion or termination of the project to the Committee on Courses of Instruction.

For further information contact the chairperson of the Committee on Courses of Instruction, c/o Academic Senate Office.



## INTERNSHIP PROGRAM

The objective of the Internship Program is to enable students to obtain practical educational experience which will complement and enhance the traditional educational process. An internship should aid individual students who wish to explore potential career opportunities and assist them in clarifying their personal and educational goals.

Students may undertake an internship by enrolling in a course numbered 92 or 192 under departmental listings. Course 192 requires a minimum of 84 units prior to enrollment. These courses are initiated by the student well in advance of enrollment by first obtaining a Request for Approval of Internship for Academic Credit form from the office handling the desired 92 or 192

course, and then making arrangements with a faculty sponsor who subsequently obtains the signature of the department chairperson. The student presents a copy of the approved request form to the Internship and Career Center on campus and enrolls for the course by Add card through the department involved. (For Public Affairs internship procedures, see under Political Science.) The deadline for each quarter is the last day for adding courses to the study list.

A maximum of 12 units of internship courses, whether taken at UCD or elsewhere, may be counted toward the 180 units minimum required for graduation.

## WITHDRAWALS AND LEAVES OF ABSENCE

Withdrawals may be granted by the University for emergency reasons or for good cause. In order to withdraw, approval must first be obtained from the dean of the student's college or school. Unauthorized withdrawals will jeopardize registration privileges and result in failing grades. Petitions for Withdrawal Forms are available at the Office of the Registrar. Information on fee refunds can be found in the Fee Refund section of this catalog. Once withdrawal forms are approved, enrolled courses will be dropped automatically. (See below for a planned temporary leave.)

If you are receiving financial aid, you must report your change of status *immediately*, in person or by mail, to the Financial Aid and Student Aid Accounting Offices; if you are receiving veterans benefits, you must also report your withdrawal to the Veterans Affairs Office.

### Readmission after an Absence

If you are a former UCD undergraduate student planning to return to the University of California at Davis, you must file an Application for Readmission available in the Office of the Registrar, with a nontransferable, nonrefundable fee of \$40. (You are a former student if you have interrupted the completion of consecutive terms of enrollment on the Davis campus.) Official transcripts of all work you may have attempted in the interim must be submitted to the Office of the Registrar.

Undergraduate students applying for readmission must file their applications on or before the following deadlines:

Quarter	Deadline Date
Fall 1990	August 24, 1990
Winter 1991	November 30, 1990
Spring 1991	February 22, 1991
Fall 1991	August 23, 1991

Graduate students applying for readmission should refer to the Graduate Division section in this catalog for filing information.

### Planned Educational Leave Program (PELP)

A Planned Educational Leave is defined as a planned interruption or pause in your regular, full-time education during which you temporarily cease formal studies at Davis while pursuing other activities that may assist in clarifying your educational goals. The intent of the program is to make it possible for a student to suspend academic work, leave the campus, and later resume studies with a minimum of procedural difficulties. PELP is not to be used for a medical leave. If you

cannot attend school because of medical reasons, you should request a Petition for Withdrawal available in the Office of the Registrar. (Also see Readmission after an Absence.)

Any registered student on the Davis campus, undergraduate or graduate, is eligible to enroll in the Planned Educational Leave Program. Freshmen and transfers who have been admitted but have not yet registered or attended classes are also eligible, providing an opportunity for beginning students to pause between high school or community college and the University.

Applicants for enrollment in PELP are required to file an application available at the Office of the Registrar, including a brief written explanation of the reason for leaving the campus, and must state when they intend to resume academic work. Applications for Planned Educational Leave must be filed with the Office of the Registrar (Admissions Office for new students) no later than the tenth day of instruction.

A fee of \$40 is charged, payable when you enroll in the program. This fee is identical to that paid by a student who withdraws and is required to pay a readmission fee upon return.

The minimum Planned Educational Leave is one full quarter; the normal maximum leave is one full academic year. You may, however, request an extension of your leave. For purposes of this program, leave of one full quarter is defined as a leave beginning no later than the tenth day of instruction in a quarter. You should be entitled to a partial refund of fees paid. (See Fee Refunds.) Enrolled courses will be dropped automatically.

Students enrolled in the program are expected to devote their leave period to non-classroom activities. Students on Planned Educational Leave are not eligible to enroll in concurrent courses on the Davis campus, may not earn academic credit at Davis, and are expected not to enroll in courses at any other institution during the period of the leave.

Readmission is guaranteed assuming you resume regular academic work at the agreed-upon date and satisfy any "holds" that may have been placed on your registration. Students who do not return at the agreed-upon date and who do not officially extend their leave will be automatically withdrawn from the University.

You will not be eligible to receive all 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 Planned Educational Leave may purchase a health care card from the Student Health Service and may retain library privileges by purchasing a library card. International students should consult Services for International Students and Scholars to find out what effects the Planned Educational Leave will have on their status. Grants and other financial aids will be discontinued for the period of the leave, but every 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.

## SCHOLASTIC REQUIREMENTS

Academic Information

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The academic year consists of three ten-week quarters, except for the School of Law which has an academic year consisting of two fifteen-week semesters. Two six-week summer sessions are also offered. Students normally attend the University three quarters per school year, but you may accelerate your progress by enrolling in one or both summer sessions.

### ACADEMIC 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 2/3; from semester to quarter units, multiply by 3/2.)

The way units of credit are assigned to courses is based on the "Carnegie unit" which assigns one 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 for one unit of credit.

In most courses at Davis the standard procedure prevails, so that a three-unit course meets for three hours a week, a four-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" (if your college or department provides them) or ask the instructor what is required in terms of outside reading, term papers, problem sets, field trips, and the like. These are not always spelled out completely in the *General Catalog*. By knowing the amount of work which will be required, you can plan your course-load more systematically and realistically.

### Credit by Examination

Under certain prescribed conditions, currently enrolled 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 Registrar. The petition is subject to the approval of the instructor giving the examination and the department involved.

The completed petition, accompanied by a fee of \$5, 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 the Graduate Division.

The credit received for the examination may not duplicate any credit you have already earned toward your degree. The final results will be reported to the Office of the Registrar which will assign you the appropriate grade and grade points. Since failure to pass the examination will be recorded as an F, you are encour-

aged to prepare fully for such an examination before attempting it.

Learning in nonacademic settings can also be validated through credit by examination.

### Enrollment at 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 enrolled as a full-time student at UCD. A variance can be obtained only by petitioning the dean of your college well in advance of the desired enrollment. In those instances in which a variance is granted, units earned are counted toward minimum progress for the term in which the dual enrollment occurs. Summer session courses are exempt from this regulation.

It is possible for students to 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 the Admissions Office for evaluation. On your transcript UCD Summer Sessions courses are identified by the letter "S" preceding course numbers. (There is no provision for auditing in Summer Sessions.)

See the Summer Sessions bulletin for detailed information.

### GRADING

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 UCD:

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

E-NWS, enrolled—no work submitted

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:

4.0=A+	2.7=B-	1.0=D
4.0=A	2.3=C+	0.7=D-
3.7=A-	2.0=C	0.0=F
3.3=B+	1.7=C-	0.0=I
3.0=B	1.3=D+	0.0=P/NP
		0.0=S/U

### Grade-Point Average (GPA)

The grade-point average is computed on courses undertaken in the University of California, with the exception of courses undertaken in University Extension. 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. 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 2.0 GPA required for graduation.

A student at Davis is expected to maintain a C (2.0 GPA) or better in all work undertaken in the University. If you fall below a C average, you are considered "scholastically deficient" (see Scholarship Deficiencies).

### Passed/Not Passed (P/NP) Grading Option

Subject to regulation by the faculties of the various colleges and schools, an undergraduate student in good standing can petition to take specific courses on a Passed/Not Passed basis. Petitions are available in deans' offices as of dates published in the *Class Schedule and Room Directory* and must be filed before the end of the fifth week 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 1/3 of the units completed in residence on the Davis campus.** Consequently, at least 2/3 of the units completed in residence at Davis and presented in satisfaction of degree requirements must be in courses taken for a letter grade. 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 introduced conditions or restrictions in addition to the University requirements. Students who plan to attend graduate or professional school should consult with Advising Services 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.

A course in which a D or F is received may not be repeated with the P/NP option. Students who received an Incomplete in a course they undertook for a letter grade may not complete the course on a Passed/Not Passed basis.

### Satisfactory/Unsatisfactory (S/U)

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. The grade of S is awarded to graduate students for work in graduate courses which otherwise

would receive a grade of B- or better, and in undergraduate courses for work which otherwise would receive a grade of C- or better.

Petitions are available from the Graduate Division and must be signed by your graduate adviser. (See also Individual Study courses.) A course in which a C, D, or F grade is received may *not* be repeated with the S/U option.

### **Passed/Not Passed (P/NP) Grading Only**

In specific courses which have been approved by the respective departments and by the appropriate Committees on Courses of Instruction, individual instructors will assign *only* Passed or Not Passed grades. Such courses count toward the maximum number of units graded P allowable toward the degree. (See also Special Study courses.)

### **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 in successive quarters. (See above for P/NP grading option.)

### **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 illness, serious personal problems, an accident, a death in the immediate family, a large and necessary increase in working hours, or other situation of equal gravity.) 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 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 term 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, and the grade is not replaced by the end of the third term succeeding the term in which the I grade was assigned, 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. At the time of graduation, however, any remaining I grades are included when your grade-point average is computed, in order to determine whether you have achieved the 2.0 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 what option you have exercised. Therefore, it is recommended that students not delay the clearance of incomplete grades so as not to jeopardize graduation.

### Changes of Grade

All grades except *I* and *IP* are final when filed by an instructor at the end of the term. No final grade except *I* may be revised by examination or the submission of additional work after the close of the term.

If, however, 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 a petition available from department offices.

### Repetition of Courses

An *undergraduate student* may repeat any course in which grades of *D*, *F*, or *NP* have been received up to a maximum of 16 units. (Repeat units of English A will not be counted against this maximum.) However, departments may restrict the repetition of a course if it is prerequisite to a course that has already been completed with a grade of *C-* or better. Repetition of a course more than once requires approval by the appropriate dean in all instances. Courses in which you have received a grade of *D* or *F* must be taken for a letter grade if repeated—not on a *P/NP* basis. (Courses in which a grade of *NP* was received may be repeated on a *P/NP* basis.) In computing the grade-point average of an undergraduate who repeats courses in the University in which a *D* or *F* was received, only the most recently earned grades and grade points are used for the first 16 units repeated. Thereafter, you will receive the grade assigned and the corresponding grade points earned for each time you take the class. When a course is repeated, the units completed will be credited toward the degree only once, but the course will appear on your record each time it is taken.

A *graduate student* may repeat any course in which a grade of *C*, *D*, *F*, or *U* has been earned, up to a maximum of nine units. A course in which a *C*, *D*, or *F* grade has been earned may not be repeated on the *S/U* basis. In computing the grade-point average of a graduate student who repeats courses in which grades of *C*, *D*, or *F* was received, only the most recently earned grade for each course and corresponding grade points will be used.

### 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 *Not Passed*) are urged to confer with their advisers.

### Final Grades

Grades are generally available about three weeks after a quarter has ended. If you wish to have your grades mailed to you, bring in a stamped, self-addressed envelope with your registration card to the Office of the Registrar before the end of the term.

### Transcripts

A record of each student's academic work at UCD is prepared and retained permanently by the Office of

the Registrar. Copies of your official transcript may be obtained from that office for \$3 a copy. Transcripts of all work done through University Extension or Concurrent Enrollment should be requested directly from the University 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.

Application for a transcript of record should be made at least two weeks in advance of the time needed.

### CLASS LEVEL

Undergraduate classification is determined by the number of quarter units you have completed:

Class Level	Unit Breakdown
Freshman	0-40.0
Sophomore	40.1-83.9
Junior	84.0-134.9
Senior	135.0-

### EXAMINATIONS

#### Final Examinations

The *Class Schedule and Room Directory* lists the times that final examinations are to be held. These are set up according to the day-and-hour periods in which the classes are given during the quarter. This information is available at the beginning of the term so that you can avoid final examination conflicts.

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 which consist of laboratory work only, and courses in which the examination has been waived (course descriptions will include the statement, "no final examination").

At the instructor's option, the final examination may be completely or in part a take-home examination. 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 published in the *Class Schedule and Room Directory*. The scheduling of an examination at a time other than the specified time requires the mutual consent of the instructor and each student enrolled in the course. Any student who does not consent in writing to a different time must 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 alternate schedule. 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 earlier than the time and date published in the *Class Schedule and Room Directory*.



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.

Students with learning disabilities may be afforded additional time for examinations (or alternate examination formats). An adjustment request must be submitted in writing to the instructor of the course involved by the tenth day of the quarter, and must include proof of the existence of a learning disability. The instructor determines, in consultation with the student and the campus Learning Disability specialist, whether an adjustment is necessary and specifies the terms of the adjustment.

The University of California, Davis seeks to accommodate any student, who in observance of a religious creed, encounters an unavoidable conflict with a test or examination schedule. It is the responsibility of the student to provide, in writing and at the beginning of the quarter, notification of a potential conflict to the individual responsible for administering the test or examination and to request 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 requester's religious creed.

An instructor may release each student's original examination, or a copy, at any time. Otherwise the

instructor will retain final examination materials, or copies thereof, until the end of the next regular term, during which period students may have access to their 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 as published in the *Class Schedule and Room Directory*. The scheduling of a midterm examination at a time other than a regularly scheduled class meeting requires mutual consent of the instructor and each student enrolled 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.

#### **ADVANCED PLACEMENT EXAMINATIONS**

If you take one or more of the College Board Advanced Placement (AP) Examinations and score 3, 4, or 5, you will be awarded college credit. The credit will become part of the minimum 180 quarter units you need in order to receive a bachelor's degree. The credit from the AP Examinations may also be used to satisfy specific degree requirements. Consult the chart on the following page to learn how many units you will receive for an AP Examination (see the column headed: Credit Toward Degree), and how those units will be applied toward specific degree require-

ments (see the column headed: Credit Allowed Toward Specific Degree Requirements). 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 UCD General Education Requirement. Rather, AP credits are counted as transfer credits and may reduce the number of GE courses you have to complete. (See Bachelor's Degree Requirements chapter.)

In general, you may not earn University credit for courses which duplicate credit already earned through AP. There are, however, some few exceptions to this general rule. Since it is often difficult to know exactly which UCD course you should take when you have earned AP credit, you should talk with an academic adviser in your department or dean's office before selecting and enrolling in classes.

The information provided in the chart applies to undergraduate students in the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science. For further clarification consult the office of your college.

## SCHOLARSHIP DEFICIENCIES

The following provisions apply to all undergraduate students in the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science. Graduate and professional students with scholarship deficiencies are subject to action at the discretion of their respective deans.

A student will be placed on **probation** for failure to meet qualitative or quantitative standards of scholarship. The *qualitative standards of scholarship* require that a student maintain a C average (2.0) or better for all work undertaken in the University and for the work undertaken in any one term.

A student will be placed on **probation for qualitative reasons** if, at the end of any term, the student's grade-point average (GPA):

- is less than 2.0, but not less than 1.5, for the term.
- is less than 2.0 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 term,

- the student's grade-point average (GPA) is less than 1.5 for the term.
- the student has attempted more than 16 units graded I (Incomplete).
- the student has spent two consecutive terms on academic probation.

The official transcript will in the case of qualitative standards reflect *in good standing* or *not in good standing*.

The *quantitative standards*, referred to as **minimum progress requirements**, define scholarship in terms of the number of units that must be satisfactorily completed. Minimum progress is defined as an average of 12 units passed per quarter, calculated at the end of every quarter for the preceding three quarters. Minimum progress requirements do not apply to students who have part-time status or to students who have

their dean's approval to carry less than the minimum progress load because of medical disability, employment, a serious personal problem, a death in the immediate family, or an accident.

The notation "*warning—minimum progress*" will be noted on the grade report for a quarter in which the student has passed fewer than 12 units. The notation "*minimum progress—subject to academic disqualification*," will be noted on the grade report the first time the total number of units passed at UCD **averages fewer than 12**, calculated at the end of every term for the preceding three terms of enrollment. Quantitative standards are not reflected on the official transcript.

Once a student is in good standing and has met quantitative standards for scholarship, the notation will be removed from the transcript.

It is assumed that a student will earn the 180-unit minimum degree requirement prior to completing fifteen terms of enrollment. Normal progress would achieve 180 units in 12 terms.

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
- Repeated courses passed to improve D or F grades
- Courses passed during Summer Sessions at UCD or at another accredited school and transferred to UCD will be counted as units passed (applied to term of enrollment just preceding the summer session)
- Courses passed by examination in accordance with policies established by the Divisional Committee on Courses (applied to term in which examination 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 term in which the I grade is received)

The dean of the student's college may grant a student a minimum progress variance of one or more quarters for an acceptable reason. Advising assistance should be obtained either through the student's faculty adviser or in the college Dean's Office.

## Dismissal

Dismissal for either qualitative or quantitative reasons (defined above) is based on the decision of the dean of the college in which a student is enrolled. Such dismissal is from the University of California system and not simply the college or the Davis campus. Should a former Davis student later wish to be readmitted on the Davis campus, the authority to do so rests with the dean of the college from which the student was dismissed.

## Transfer with Scholastic Deficiencies

To transfer from one University campus to another, or from one college or school to another on the same campus, a disqualified or probational student must obtain the approval of the dean whose jurisdiction is

## College Board Advanced Placement (AP) Examination Credit

EXAMINATION	SCORE	UCD COURSE EQUIVALENCIES	CONTINUING COURSE	CREDIT TOWARD DEGREE	CREDIT ALLOWED TOWARD SPECIFIC DEGREE REQUIREMENTS
<b>ENGLISH</b>					
English	5, 4	English A, 1, 3		8 units	<b>English/Humanities Credit</b> Satisfies Subject A requirement. <i>College of Agricultural and Environmental Sciences:</i> 4 units Four units satisfies first part of English composition requirement. <i>College of Engineering:</i> 8 units Satisfies English 1, 4 units toward Humanities and Social Sciences electives, and 2 units toward Unrestricted electives. <i>College of Letters and Science:</i> Satisfies first course toward English Composition requirement. Satisfies Subject A requirement.
English	3	English A		8 units	
<b>FOREIGN LANGUAGES</b>					<b>Humanities Credit/Unrestricted Electives</b>
French	5	French 22	French 23, or consultation with adviser	8 units	4 units For each foreign language examination passed. In the <i>College of Agricultural and Environmental Sciences</i> , satisfies credit toward Humanities/Unrestricted electives.
French	4	French 21	French 22	8 units	In the <i>College of Letters and Science</i> , examinations (except for Latin) satisfy the Foreign Language requirement.
French	3	French 3	French 21	8 units	In the <i>College of Engineering</i> , awards units toward the Unrestricted electives requirement.
German	5, 4	German 4, 6A, or 6B	German 101, upper division literature courses	8 units	
German	3	German 3	German 4, 100A, 100B, or 100C	8 units	
Latin (Vergil)	5, 4, 3	Latin 2	Determined by consultation with Classics adviser	4 units	
Latin (Lyric)	5, 4, 3	Latin 2	Determined by consultation with Classics adviser	4 units	
Spanish	5, 4	Spanish 5, 4	Spanish 6 and 28 or more advanced course	8 units	
Spanish	3	Spanish 4	Spanish 5, or consultation with adviser	8 units	
<b>HUMANITIES</b>					<b>Humanities Credit/Unrestricted Electives</b>
Art Studio	5	Art 2, 5		8 units	In the <i>College of Letters and Science</i> , partially satisfies Area (breadth) requirements for A.B. degree.
Art Studio	4	Art 2		4 units	In the <i>College of Letters and Science</i> , partially satisfies Area (breadth) requirements for A.B. degree.
Art History	5	Art 1A, 1B, 1C		8 units	In the <i>College of Letters and Science</i> , partially satisfies Area (breadth) requirements for A.B. degree.
American History	5, 4, 3	History 17A, 17B		8 units	Satisfies American History and Institutions requirement. History 17A, 17B, and 17C may be taken for full credit.
European History	5, 4, 3	History 4B, 4C		8 units	History 4A and 4B may be taken for full credit.
Music	5, 4, 3	Music 10		8 units	In the <i>College of Letters and Science</i> , partially satisfies Area (breadth) requirements for A.B. degree.
<b>NATURAL SCIENCES</b>					<b>Natural Sciences Credit/Preparatory Courses for Science Majors</b>
Biology	5, 4, 3	Biological Sciences 10		8 units	Biological Sciences 1A is the first course taken by most students contemplating majors in the Life Sciences.
Chemistry	5, 4	Chemistry 1A, 1B		8 units	Credit for Chemistry 1A and 1B equivalence may serve as prerequisite to 1C with consent of instructor. Although 1A and/or 1B may be taken for full credit, students are strongly encouraged to enroll in the 4A-4B-4C sequence.
Computer Science AB	5, 4	Computer Science Engineering 30	Computer Science Engineering 40	4 units	Credit for Computer Science Engineering 30 may serve as prerequisite for Computer Science Engineering 40 with consent of instructor
	3			4 units	In the <i>College of Engineering</i> , rewards units towards the unrestricted electives requirement
Computer Science A	5, 4, 3		Computer Science Engineering 30	2 units	
Mathematics AB	5, 4	Mathematics 11, 16A, or 21A	Mathematics 16B or 21B	4 units	Mathematics 16A or 21A may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B
Mathematics AB	3		Mathematics 16A or 21A	4 units	
Mathematics BC	5	Mathematics 11, 16A-16B, or 21A-21B	Mathematics 16C or 21C	8 units	Mathematics 16A, 16B, 21A, or 21B may be taken for full credit. Mathematics 16A, 16B, 21A, or 21B equivalents may serve as a prerequisite for Mathematics 16B, 16C, 21B, or 21C.
Mathematics BC	4, 3	Mathematics 11, 16A, or 21A	Mathematics 16B or 21B	8 units	Mathematics 16A or 21A may be taken for full credit. Credit for Mathematics 16A or 21A equivalents may serve as prerequisite for Mathematics 16B or 21B.
Physics B	5	Physics 1A, 1B, 5A, 5B, 5C, 10	Determined by consultation with adviser	8 units	No credit for laboratory parts of Physics 5 or 9.
Physics B	4, 3	Physics 10		8 units	Course equivalents may be used as prerequisite for succeeding courses of same series with consent of instructor.
Physics CI	5	Physics 1A, 5A, or 9A		4 units	In the <i>College of Engineering</i> , only a score of 5 on Physics (CI and CII) Examinations applies toward Physics requirement.
Physics CI	4	Physics 1A or 5A		4 units	
Physics CII	5, 4	Physics 1B		4 units	
<b>SOCIAL SCIENCE</b>					<b>Social Science Credit Unrestricted Electives</b>
American Government and Politics	5, 4, 3	Political Science 1		4 units	Political Science 1 satisfies American History and Institutions requirement.
Comparative Government and Politics	5, 4, 3	Political Science 2		4 units	In <i>College of Agricultural and Environmental Sciences</i> , satisfies credit toward Social Science requirement or Unrestricted electives. In <i>College of Engineering</i> , awards credit toward Humanities-Social Sciences electives requirement.
Economics	5, 4, 3	Economics 1A, 1B	Determined by consultation with Economics adviser.	8 units	

being sought. Following the transfer, the student is subject to supervision by the faculty of the new college, school, or campus.

## HONORS AND PRIZES

### Deans' Honors Lists

According to Davis campus regulations, the quarterly Dean's Honors List is comprised of names of students who have completed, for a letter grade, a minimum of 12 units in a specific term 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 the preceding term. Any additional regulations set by a particular college will be stated within that section of this catalog. Honors Lists will be posted quarterly on bulletin boards outside Dean's Offices, and a notation of these honors will be placed on each student's permanent record by the Office of the Registrar.

### Scholarships

Students with outstanding academic records who show promise of continued scholarly achievement are encouraged to apply for scholarship recognition and awards. Awards are accompanied by a financial honorarium or stipend.

### Graduation Honors

Honors at graduation may be awarded to students who have completed units of credit in the University with a grade-point average which places them in the corresponding *top percent* of the graduating class of their college or school, as shown in the table below, and who have met additional college requirements:

Total Quarter Units Completed at UC	Highest Honors	High Honors	Honors	Total
45-89	2%	2%	4%	8%
90-134	3%	3%	6%	12%
135+	4%	4%	8%	16%

The grade-point averages which mark the cut-off points for each honors category for the June graduating class (namely, winter term grades for candidates for June of each year) will be used as minimum criteria for the award of the same category of honors to students who graduate in the terms immediately following. Grade-point averages for the cut-off points (in the table above) for Winter Quarter 1990 are shown below. These averages will be used through winter 1991.

Percent Determining Cut-Off Point	Grade Point Average by College		
	Agricultural and Environmental Sciences		Letters and Science
	Sciences	Engineering	Science
2%	3.831	3.892	3.863
3%	3.788	3.843	3.800
4%	3.738	3.795	3.763
6%	3.674	3.706	3.692
8%	3.618	3.634	3.636
12%	3.493	3.537	3.537
16%	3.391	3.471	3.458

All students having the same grade-point average as the one that falls at each percent cut-off point will be awarded honors in that category.

Students should refer to specific college sections of this catalog for any additional requirements.

A notation of awards is made on the student's diploma

and on permanent records in the Office of the Registrar.

### Prizes

The University Medal is the highest honor awarded to a graduating senior in recognition of superior scholarship and achievement. In addition, a College or School Medal is 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.

### Honorary Societies

Election to an honorary society is one of the most prestigious awards a student can receive. At UC Davis, the following honorary societies are represented:

- Alpha Epsilon (Agricultural Engineering)
- Alpha Kappa Delta (Sociology)
- Alpha Omega Alpha (Medicine)
- Alpha Zeta (College of Agricultural and Environmental Sciences)
- Delta Phi Alpha (German)
- Dobro Slovo (Russian)
- Golden Key (All colleges and schools)
- Omicron Delta Epsilon (Economics)
- Omicron Nu (Applied Behavioral Sciences)
- Order of the Coif (Law)
- Phi Alpha Theta (History)
- Phi Beta Kappa (College of Letters and Science)
- Phi Kappa Phi (All colleges and schools)
- Phi Sigma (Biological Sciences)
- Phi Zeta (Veterinary Medicine)
- Pi Alpha Xi (Environmental Horticulture)
- Pi Delta Phi (French and Italian)
- Pi Mu Epsilon (Mathematics)
- Pi Sigma Alpha (Political Science)
- Prytanean Honor Society (All colleges and schools—women only)
- Psi Chi (Psychology)
- Sigma Pi Sigma (Physics)
- Sigma Xi (All colleges and schools—research)
- Tau Beta Pi (Engineering)

# Bachelor's Degree Requirements

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Four groups of requirements must be satisfied before a student can become eligible for candidacy for the bachelor's degree. They are:

1. University requirements, which apply to all colleges;
2. General Education requirement, which applies to all colleges;
3. College requirements; and
4. Major requirements.

Detailed information on University requirements and the General Education requirement can be found on the following pages. (See specific college sections for information on college and major requirements.)

## Bachelor's Degree Requirements

### University Requirements

All students must fulfill the following University of California requirements:

#### Subject A

American History and Institutions  
Unit Requirement  
Residence Requirement  
Scholarship Requirement

### General Education Requirement

Students are required to complete a certain number of courses in the two areas of General Education other than the one which contains their major field.

### College Requirements

College of Agricultural and Environmental Sciences

Unit  
Scholarship  
English Composition  
Breadth (in the major)

College of Engineering

Unit  
Residence  
Scholarship  
English Composition  
Design  
Humanities/Social Science

College of Letters and Science

Unit  
Residence  
Scholarship  
English Composition  
Foreign Language (A.B. and B.A.S. degrees)  
Area (Breadth) Credit

### Major Requirements

Course requirements for each major are listed in the Programs and Courses section of this catalog.

## UNIVERSITY REQUIREMENTS

### Subject A: English Requirement

The University requires every undergraduate student to demonstrate college-level proficiency in English composition. Satisfaction of the Subject A requirement is a prerequisite to all other undergraduate courses in English.

The requirement, as determined by Undergraduate Admissions, may be met in one of the following ways:

- By achieving a score of 600 or higher on the College Board Achievement Test in English Composition.
- By achieving a grade of 5, 4, or 3 in the College Board Advanced Placement Examination in English.
- By entering the University with credentials showing the completion of an acceptable 3-semester or 4-quarter unit college-level course in English composition with a grade of C or better.
- By passing *with credit* the California State University and Colleges English Equivalency Examination. (Note: the CSUC English Placement Test *may not* be used to satisfy the Subject A requirement.)
- By writing a passing essay on the Subject A Examination. This examination may be taken only once. It is offered in the spring at local sites throughout California; a student admitted for fall quarter who has not already satisfied the Subject A requirement *must* take this examination. An out-of-state student or any California freshman admitted after mid-April will take another form of the Subject A Examination, which will be offered on the UCD campus during the orientation period each quarter. For the time and location consult the "Schedule for Registration and Orientation," published prior to the beginning of each quarter.

If you have not satisfied the requirement in one of the ways described above, *you must enroll in English A during your first quarter of residence at the University, or as soon thereafter as space is available in the course.* The English A course must be taken for a letter grade and passed with a grade of C or higher. Students receiving a grade of C- or lower must repeat the course. This 2-unit course counts as 4 units on your study load and toward minimum progress.

Students whose native and school language is not English, and some students whose schooling combines work in the United States and in another country, must demonstrate proficiency in English. The level of proficiency must meet the standards of both the non-native speakers of English program and the Subject A program. The results of the Subject A Examination and a special examination in English administered during the orientation period each quarter determine whether a student has met the Subject A requirement or must take specific course work before meeting that requirement.

### 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 the following ways:

- By offering 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.

- By completing any one of the following courses:

Afro-American Studies 10, 100, 120, 121

Asian American Studies 1, 2

Economics 111A, 111B

History 17A, 17B, 72A, 72B, 170A, 170B, 170C, 171A, 171B, 174A, 174B, 174C, 175A, 175B, 175C, 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, 55, 116, 130A, 130B, 130C

Political Science 1, 5, 100, 101, 102, 103, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163

(Students electing to offer one of the above courses are subject to the rules that apply for prerequisites and majors.)

- By presenting evidence that the requirement has been accepted as satisfied at another campus of the University.
- By presenting 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 the Davis campus.
- By successful completion of the Advanced Placement Examination in American History.

International students, regardless of the type of visa they hold, must meet the University's American History and Institutions requirement for graduation.

### **Unit Requirement**

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 or school (see appropriate college or school).

A maximum of 12 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 the Office of 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). 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. Thirty-five of the final 45 quarter units completed by each candidate must be earned while in residence on the Davis campus. Not more than 18 of these 35 quarter units may be completed in summer session courses at UCD.

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. Enrollment is with the consent of the instructor only.

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.

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 for all courses you have attempted in the University. An exception to this rule is authorized for those students undertaking certain honors courses. Grades earned in University Extension courses are not used in calculating individual grade-point averages. For specific college and school requirements consult the appropriate sections of this catalog.

### Filing for Degree Candidacy

Each candidate for an undergraduate degree must file an Announcement of Candidacy with the Office of the Registrar for the quarter in which the candidate plans to receive the degree. The dates for filing are published in the Academic Information chapter.

## GENERAL EDUCATION REQUIREMENT

The General Education Program seeks to promote the intellectual growth of all students in the undergraduate colleges. The program's objectives are: (1) to offer a coherent choice of courses in all major fields of learning; (2) to stimulate intellectual growth through the study of important methods as well as significant material in a particular discipline; (3) to involve students in the learning process by requiring considerable writing and serious participation in class activities; and (4) to encourage students to apply the concepts and methods of a discipline in appropriate advanced-level courses.

General Education (GE) courses are grouped into three broad areas of knowledge:

1. **Civilization and Culture.** Courses in this area are designed to foster knowledge of the dominant intellectual traditions, achievements, and socio-political institutions of humankind and to stimulate awareness of cultural diversity within the Western tradition and in other civilizations.
2. **Contemporary Societies.** Courses in this area are designed to create an awareness of critical economic, political, and social problems of the contemporary world.
3. **Nature and Environment.** Courses in this area are aimed at providing students with knowledge of major scientific ideas and discoveries and some perception of the methods, scope, power, limitations, and appeal of science. It is a major goal of the General Education Program that students not primarily interested in scientific disciplines be prepared to read and understand scientific literature addressed to the educated public.

## Fulfilling the General Education Requirement

The only way that you can fulfill the GE requirement is by completing a required number of approved GE courses at UCD (see the exceptions in the paragraph below). If you have transferred from a community college or other post-secondary institution, or enter with Advanced Placement (AP) units, you still have to complete some of Davis' GE courses, but the number of required courses may be reduced depending upon the number of transfer or AP units you have brought with you.

**Transfer Credit.** The following courses and transfer credits will be used in determining the General Education requirement for transfer students:

- UCD Extension courses if they are accepted for transfer by the Office of Undergraduate Admissions.
- Advanced Placement credit.
- Transfer work from other community colleges and four-year institutions.

UCD Summer Sessions courses completed *prior* to entry do not count as "transfer credit" for determining your GE requirement. Successful completion of an approved GE course during a UCD Summer Session prior to entry, however, will count toward satisfaction of the GE requirement.

You should consult the "Transfer Credit Evaluation" form prepared by the Office of Undergraduate Admissions to determine your transfer credits.

You are *exempt* from the UCD General Education Requirement if

- you come from a California community college or other institution of higher education and have completed the "Transfer Core curriculum";
- OR**
- you come from another campus of the University of California and have completed the lower division breadth or General Education requirements of that campus.

Your college dean's office can tell you whether you fall into either of these categories.

## Determining Your General Education Requirement

Each academic major and degree program has been assigned to one of the three areas of General Education. Each GE course has also been assigned to one of the three areas. You must complete courses in those areas of General Education *other* than the one which contains your major field.

GE courses may be either introductory or non-introductory. Introductory courses assume no prior knowledge or exposure to the field. Non-introductory courses require some background course work or familiarity with the subject. You should consult the course descriptions contained in the Programs and Courses section of this catalog for the courses recommended as preparation for non-introductory courses.

The specific General Education requirements for students entering UCD from the 1984-85 to 1986-87 academic years and from 1987-88 and thereafter are detailed in the table opposite.

## GENERAL EDUCATION REQUIREMENTS

(GE courses must be completed in the areas of General Education other than the area containing the major.)

Student Status	Academic Year of Entrance to UCD			
	1984-85	1985-86	1986-87	1987-88, and thereafter
Freshman or transfer student with 40 or fewer transfer units <sup>1</sup>	<p>2 GE courses:</p> <ul style="list-style-type: none"> <li>• may be in same or different areas;</li> <li>• may be introductory or non-introductory</li> </ul>	<p>4 GE courses:</p> <ul style="list-style-type: none"> <li>• maximum of 3 in one area;</li> <li>• maximum of 2 introductory</li> </ul>	<p>6 GE courses:</p> <ul style="list-style-type: none"> <li>• 3 courses in each of two areas;</li> <li>• must have 1 introductory and 2 non-introductory courses in each area</li> </ul>	Same as for 1986-87
Transfer student with more than 40 but fewer than 84 units <sup>2</sup>	No GE requirement	<p>2 GE courses:</p> <ul style="list-style-type: none"> <li>• may be in the same or different areas;</li> <li>• may be introductory or non-introductory</li> </ul>	<p>4 GE courses:</p> <p><i>Option 1:</i> 2 courses in each of two areas:</p> <ul style="list-style-type: none"> <li>• only 1 course in each area may be introductory</li> </ul> <p><i>Option 2:</i> 3 courses in one area and 1 in the other:</p> <ul style="list-style-type: none"> <li>• must have 1 introductory and 2 non-introductory in the area with 3 courses;</li> <li>• the single course in the other area may be introductory or non-introductory</li> </ul>	Same as for 1986-87
Transfer student with 84 or more units	No GE requirement	No GE requirement	<p>2 GE courses:</p> <ul style="list-style-type: none"> <li>• may be in the same or different areas;</li> <li>• may be introductory or non-introductory</li> </ul>	<p>2 or 3 GE courses:</p> <p><i>Option 1:</i> 1 course in each of two areas:</p> <ul style="list-style-type: none"> <li>• both courses must be non-introductory</li> </ul> <p><i>Option 2:</i> 3 courses in one area:</p> <ul style="list-style-type: none"> <li>• must have 1 introductory and 2 non-introductory courses</li> </ul>

1. For the academic years 1984-85 though 1986-87, this category of GE requirements applied to freshmen or transfer students with **fewer than 41 units**; the unit cut-off was changed fall 1987.

2. For the academic years 1984-85 through 1986-87, this category of GE requirements applied to transfer students with **41 or more but fewer than 84 units**; the unit cut-off was changed fall 1987.

### Selecting General Education Courses

Since GE courses must be chosen from the two areas of General Education other than the one containing your major field, you must begin by identifying the area of General Education to which your major has been assigned. The following list provides this information.

#### Civilization and Culture (CC)

American Studies	Greek
Art History	History
Art Studio	Italian
Chicano (Mexican-American) Studies (Humanities emphasis)	Landscape Architecture
Classical Civilization	Latin
Comparative Literature	Linguistics
Design	Medieval Studies
Dramatic Art	Music
East Asian Studies	Philosophy
English	Religious Studies
French	Rhetoric and Communication
German	Russian
	Spanish

#### Contemporary Societies (CS)

Afro-American Studies	Environmental Policy
Agrarian Studies	Analysis and Planning
Agricultural and Managerial Economics	Geography (A.B. degree—emphasis I, II, III, V)
Agricultural Education	Human Development
Anthropology (A.B. degree)	International Agricultural Development
Applied Behavioral Sciences	International Relations
Asian American Studies (non-degree program)	Native American Studies
Chicano (Mexican-American) Studies (Sociology emphasis)	Political Science
Economics	Political Science—Public Service
Environmental Biology and Management	Sociology
	Sociology—Organizational Studies
	Textiles and Clothing
	Women's Studies

**Nature and Environment (NE)**

Agricultural Science and Management	Food Science
Animal Science	Genetics
Anthropology (B.S. degree)	Geography (B.S. degree; A.B. degree—emphasis IV)
Applied Science	Geology
Avian Sciences	Mathematics
Biochemistry	Microbiology
Biological Sciences	Nutrition Science
Botany	Physical Education
Chemistry	Physics
Community Nutrition	Physiology
Computer Science	Plant Science
Consumer Food Science	Psychology
Dietetics	Range and Wildlands Science
Engineering (all majors)	Resource Sciences
Entomology	Soil and Water Science
Environmental Toxicology	Statistics
Fermentation Science	Wildlife and Fisheries Biology
Fiber and Polymer Science	Zoology
Food Biochemistry	

If you have declared **multiple majors** where all of your majors are classified in the same area of General Education, you complete the General Education requirement just as you would if you had a single major. If your majors are classified in two or more different areas of General Education, you are required to



complete only the appropriate number of courses in the one area of General Education in which you do not have a major.

If you have an approved **individual major**, it should have been assigned to one of the three General Education areas at the time it was approved by your college. If you have any questions concerning the General Education area to which your major is assigned, consult your college dean's office.

**Approved General Education Courses**

A list of the courses and course sequences which have been approved for offering under the General Education Program appears on the following page. This listing is subject to change. You should check the *Class Schedule and Room Directory* each quarter for the most current information.

**Restrictions Applicable to GE Courses**

Effective with the fall quarter 1986, there are two restrictions that apply to GE courses.

1. **Letter grading.** No GE credit will be awarded for a course that is taken on a Passed/Not Passed basis.
2. **Subject A.** This requirement must be completed before you begin your GE course work. Exception: GE credit may be earned before completing the Subject A requirement for the following course sequences which have been approved for the General Education Program: Chemistry 1A-1B, Economics 1A-1B, Psychology 15-16, and Music 3A-3B.

If you completed a GE course before fall 1986 on a Passed/Not Passed basis or before having completed Subject A, you will receive GE credit for that course.

**General Education Literature Preparation List**

The recommended General Education preparation listed in the course descriptions of some non-introductory courses states "any course from the GE Literature Preparation List." This list consists of the following courses: English 3, Comparative Literature 1, 2, 3, French 25, German 52, and Integrated Studies 2D.

**Approved General Education Clusters**

General Education "clusters" are groups of closely-related introductory GE courses. There are two approved clusters in the area of Civilization and Culture: History 4A, 4B, 4C; and Comparative Literature 1, 2, 3.

You may earn credit for having satisfied the entire requirement in an area of General Education by completing an approved cluster which allows you to substitute introductory for any required non-introductory courses.

**COLLEGE AND MAJOR REQUIREMENTS**

The chart at the beginning of this chapter outlines College requirements in addition to the University and General Education requirements. Detailed information on college and major requirements can be found in specific college chapters which begin immediately after this section. Course requirements are listed under each major program in the Programs and Courses section of the catalog.

**Note:** This list contains approved GE courses for the current academic year only. Please consult prior years' catalogs or the Deans' offices for the lists of courses approved in previous years. Please note that you cannot claim GE credit for a course you completed **before** it was an approved GE course.

## Civilization and Culture

### Introductory

American Studies 1B  
Art 1A/1AG<sup>1</sup>, 1B/1BG<sup>1</sup>, 1C/1CG<sup>1</sup>, 1D/1DG<sup>1</sup>, 25/25G<sup>1</sup>  
Classics 4A, 17A, 17B, 17C, 20  
Comparative Literature 1, 2, 3, 5, 6, 7, 12, 13, 25  
English 3, 4  
French 25  
German 48, 52  
History 3, 4A, 4B, 4C, 8, 9A, 17A, 17B, 161A  
Integrated Studies 2B, 2D, 3B, 3C, 8B  
Italian 50  
Linguistics 1  
Music 3A-3B<sup>2</sup>, 10  
Philosophy 1, 10B, 10D, 13, 14, 17, 21, 22, 23, 24, 31  
Political Science 4  
Religious Studies 21, 40  
Russian 44

## Civilization and Culture

### Non-Introductory

Art 178C  
Classics 140, 141, 143  
Comparative Literature 8, 20, 135, 141, 153, 157, 159C, 160A, 160B, 161A, 161B, 163, 164A, 164B, 164D, 166A, 166B, 168A, 168B, 169, 170  
Dramatic Art 156, 157  
Education 120  
English 30A, 30B, 45, 46A, 46B, 46C, 118, 127, 156, 162, 171A, 171B, 182, 184  
French 112, 113, 114  
German 110, 113, 115A, 116, 117A, 118A, 118B, 140  
History 30, 72A, 138, 140, 147A, 147B, 147C, 169A, 169B, 175A, 177A, 177B, 188A  
Italian 140, 142  
Landscape Architecture 140  
Medieval Studies 20A, 20B, 20C, 120E  
Music 110A, 110B, 110C, 110D, 129  
Native American Studies 130A, 130B, 156, 181A, 181B, 181C  
Philosophy 18, 101, 102, 105, 107, 108, 151  
Religious Studies 18, 141A, 141B, 141C  
Rhetoric and Communication 110  
Russian 130, 131, 151, 166  
Spanish 149

## Contemporary Societies

### Introductory

American Studies 1A  
Anthropology 2, 4  
Economics 1A-1B<sup>2</sup>  
Environmental Studies 10  
Geography 2-2G<sup>1</sup>, 5-5G<sup>1</sup>  
History 10  
Integrated Studies 3A, 3D, 3E, 8C  
Native American Studies 10  
Political Science 1, 2  
Psychology 15-16<sup>2</sup>  
Religious Studies 1, 2  
Sociology 2, 3

## Contemporary Societies

### Non-Introductory

Afro-American Studies 100, 133  
Agricultural Economics 120, 141, 141M

American Studies 45, 120, 130  
Anthropology 25, 101, 124, 129, 130, 133, 178  
Applied Behavioral Sciences 2, 151, 153, 154, 178  
Chicano Studies 132  
Consumer Science 100  
Economics 106  
Education 110, 122, 132  
Engineering: Civil 160  
Environmental Studies 101, 133, 161, 165, 166  
Geography 124, 155, 170, 171  
History 22, 165, 188B  
Human Development 15  
International Agricultural Development 10  
Linguistics 113  
Native American Studies 130C, 180  
Philosophy 117  
Psychology 175, 177  
Resource Sciences 10-10G<sup>1</sup>  
Rhetoric and Communication 152  
Russian 132  
Sociology 25, 119, 157  
Textiles and Clothing 107  
Women's Studies 50

## Nature and Environment

### Introductory

Anthropology 1  
Astronomy 10  
Avian Sciences 11  
Biological Sciences 10  
Botany 10  
Chemistry 1A-1B<sup>2</sup>, 10  
Engineering 20  
Entomology 17  
Food Science and Technology 2  
Genetics 10  
Geology 1-1G<sup>1</sup>, 3-3G<sup>1</sup>  
Human Development 19  
Integrated Studies 1A, 1B, 8A  
Nutrition 10-11<sup>3</sup>, 20  
Philosophy 31  
Physics 10  
Plant Science 10  
Wildlife and Fisheries Biology 10

## Nature and Environment

### Non-Introductory

Agrarian Studies 2  
Animal Science 1, 2  
Anthropology 15, 23, 152, 153  
Atmospheric Science 10  
Avian Sciences 13  
Botany 101  
Engineering 160  
Engineering: Applied Science 137  
Engineering: Civil 30  
Entomology 111, 119, 153  
Environmental Studies 30, 116-116G<sup>1</sup>  
Geology 43, 113, 116-116G, 131, 135, 144  
Landscape Architecture 155  
Microbiology 20  
Philosophy 108  
Physics 137, 160  
Resource Sciences 2, 3-3G<sup>1</sup>, 131  
Textiles and Clothing 110  
Water Science 10, 100  
Zoology 138

<sup>1</sup>These GE courses must be taken concurrently for General Education credit and will satisfy the requirement for one GE course.

<sup>2</sup>This is a two-course sequence of non-GE courses which will satisfy the requirement for one GE course.

<sup>3</sup>Nutrition 10 and 11 must both be completed to satisfy the requirement for one GE course. These courses may be taken concurrently, if offered, or sequentially (10 then 11).

# College of Agricultural and Environmental Sciences

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Information:  
College Office  
228 Mrak Hall  
916-752-0107

Challenges and opportunities arising from social and technological changes characterize these times. Today's challenges—protecting the environment from humans' diverse activities, improving nutrition in major segments of the population, developing and utilizing human and renewable natural resources—are reflected in the programs and offerings of the College of Agricultural and Environmental Sciences.

Teaching, research, and extension in the College now transcend the traditionally important mission of food and fiber production. Other important missions are the environment, quality of life, and basic biology. Activities range from the soil to the home, from the farms to the cities. The best uses of land and forest areas, as well as the management of water for home, agriculture, wildlife, recreation, and industry are studied. These areas, reflected in the thirty-eight majors in the College, offer interesting and practical career opportunities.

Social and human aspects as well as biological and technological advances are major College considerations. The goal is to develop concern within people; a concern not only with the technology but with the human benefits or problems that such technology might create. Through the application of the biological, physical, and social sciences to resource management, farming, ranching, food processing, business, education, conservation, recreation, the family, and the community, College programs are designed to meet today's challenges and contribute significantly to effective solutions for tomorrow's problems.

## STUDENT RESPONSIBILITY

In recent years, students' points of view have had a significant impact on both educational programs and

College governance. Students participate in designing the College's programs and are included on College, departmental, and general faculty committees that determine a wide spectrum of educational and administrative policies. If you want to take part in the committee system, let us know in the Dean's Office, 228 Mrak Hall.

Student representatives are elected from each major in the Spring Quarter to serve on the Dean's Student Advisory Committee (DSAC). The DSAC meets with the Dean monthly throughout the academic year to discuss issues of concern to students and the College. Subcommittees are established to study special topics and to develop student recommendations on major policy issues affecting the college and/or campus.

Teaching excellence depends on constructive help from all students. As full participants in the educational process, students are expected to provide faculty advisers, departmental chairpersons, and the deans with candid appraisals of College programs. The College also uses questionnaires to evaluate the success of its programs and to determine immediate student reactions to courses and instructors. You are encouraged to communicate with the Dean's Office at any time, in person or by letter, concerning the impact of College programs on your education or ways in which these programs may be improved. Such information is very important in planning to meet the educational needs of future students.

## PROGRAM PLANNING

**Your Role in Program Planning.** Although many services are provided to assist in program planning, in the last analysis you are the one who determines which program to pursue. The most crucial decision you make in this process is selecting your educational objectives. These may or may not require enrollment in a university. As part of making this decision, you

should investigate the educational opportunities in the College by visiting the campus before applying for admission and talking with the associate dean, faculty members, advising staff, and students. If the University is to be a means of reaching a career decision, you should examine its potential for meeting your goals.

Once you decide to enroll in the College and have chosen an educational objective, be it specific or exploratory, the College's advising services can be of assistance. Our advisers know the resources of the College and the campus and can help you use them to accomplish specific goals. The advisers can, in fact, be called upon long before you arrive on campus. High school students desiring information about college preparatory programs and college students contemplating transfer are encouraged to seek guidance from our deans and faculty advisers as early as one or two years before coming to the Davis campus. This is best done in person, although information can be provided by letter or phone.

It has been the experience of advisers that the college's programs are flexible to serve a student's needs. Recommendations meant to serve as guides are sometimes misunderstood to be hard and fast rules. The phrase "courses normally taken by students" often leads students to believe the courses are specifically required when they are not. In designing a major program individual students should consult their adviser and the *General Catalog* to find the most suitable courses. Prerequisites to selected courses need to be planned in advance.

Education is a building process. It is difficult or impossible to learn advanced principles without first understanding elementary ones. As a matter of convenience, most students acquire preparatory knowledge through prerequisite courses, but that is not the only route available. If you have acquired the knowledge by other means, you need not take the specified prerequisite. Instructors will often indicate on the basis of informal discussions that you are prepared for advanced study without the need for prerequisite courses. Courses may also be challenged by examination.

Flexibility in planning has also been constrained by the belief that students in one college may not take courses in other colleges. This is *not* true. Within the boundaries of enrollment limitations and Academic Senate policy—and your ability to acquire useful knowledge as a result of taking a particular course—you may enroll in almost any course listed in this catalog.

## COLLEGE ADVISING SERVICES

University life is a complicated, sometimes bewildering experience. The College offers a variety of ways that you can obtain advice or help in solving your problems. Each major has its own advising system and students should contact their major department for assistance and/or referral. Some of these services are described in the sections following.

### Office of the Dean

The Dean's Office is open to students for a variety of services. The professional staff can assist you with many of your academic advising and extra-curricular activities. Its primary functions are:

- Academic advising: advice regarding probation/dismissal status, admission to College, readmission, and second bachelor's, limited, and regular status.
- Action on petitions that require the Dean's approval (e.g., change of major, change of 1 grade, change of status, waiver of minimal progress, late Add/Drop petitions, PELP petitions, Withdrawal petitions.)
- Additional services include: Study Plan clearance; College English requirement check; release of holds on registration packets; evaluation of each student's record for graduation purposes; and a Special Events unit in the College, which is responsible for the College Commencement Program.

### Faculty Advisers

You will be assigned a faculty adviser to help you plan a program that corresponds to your individual educational interests. The assignments are made by Master Advisers, each of whom is responsible for coordinating advising within a major. If you have not decided on a specific major, you will be assigned to the Exploratory Program. In this case, you will have a faculty adviser especially familiar with the breadth of course offerings available in this and other colleges. On the other hand, if you have well-defined educational objectives, you will be assigned a faculty adviser with the training and experience required to facilitate your program planning.

The function of faculty advisers is to sensitize students to the educational opportunities at Davis, to discuss the implications of options available, and generally, on the basis of experience, to help students achieve their educational goals. The great potential which a faculty adviser-student relationship can have has long been recognized within the College, and you are strongly urged to consult with your faculty adviser each quarter prior to 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.

### Advising Centers

General information on all majors is available at the College's Academic Advising Center, 122 Hoagland Hall, where major advising activities in the College are coordinated. Advising for students in the Exploratory Program and Individual major is also carried out in the Academic Advising Center.

There are also numerous major Advising Centers available to assist you in a variety of ways. They are staffed by Advising Associates who are knowledgeable in all aspects of university and college rules and regulations, courses, specific requirements of their particular major(s), career opportunities, etc.

### Peer Advisers

Student advisers are available in the College's Academic Advising Center, in other advising centers, and at The First Resort. These peer advisers keep themselves up to date on the "how's," and "where's," and "why's," of University operating procedures. They are prepared to answer a variety of questions about courses, requirements, and enrollment procedures,

and are both a source of information and a means of referral to the right person or office for action.

## **Associate Deans of Resident Instruction and Student Affairs**

Associate Deans:  
Ericka L. Barrett  
Shu Geng  
228 Mrak Hall  
916-752-0107

The College has two associate deans of resident instruction and student affairs and an advising staff who welcome the opportunity to become acquainted and to talk informally with individual students. They can also help you with academic problems if you are placed on probation or subject to dismissal.

### **Orientation Class**

Each quarter the College offers an Orientation course (see Programs and Courses section) to introduce students to the University, to aid them in formulating educational objectives, and to help them identify the many educational opportunities at UCD. Although not required, this course is recommended as a useful means for discovering what the Davis campus and the College of Agricultural and Environmental Sciences are all about.

### **Expanded Course Descriptions**

You may find that, because of space limitations, the descriptions in the *General Catalog* will not include all the information you would like about a course. The faculty of the College has responded to this need by writing the "Expanded Course Descriptions" giving more detailed explanations about each of its course offerings. These descriptions are available each quarter to assist students in selecting their courses. They contain such information as course goals, 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 Shields Library Reference and Periodicals desks, the College Dean's Office, advisers' offices, advising centers, departmental offices, The First Resort, and in the dormitories at the head residents' offices.

### **Internship Courses**

Students who wish to secure credit for an internship must arrange for enrollment in a 92 or 192 course through the appropriate department and the Internship and Career Center. (See the College Requirements for unit limitations.)

## **MAJOR PROGRAMS**

### **Choosing a Program**

There are several alternatives available to undergraduate students in the College of Agricultural and Environmental Sciences:

- A regularly established major program
- An individually designed major program
- A preprofessional program

- The exploratory program eventually leading to one of the first two alternatives

### **Subject Areas and Majors**

The majors and special programs in the College are listed below according to Subject Matter Areas. Questions regarding a major should be addressed to the advising centers or the Dean's Office. Complete outlines of these majors and programs are presented in the Programs and Courses section of this catalog.

If you fulfill the requirements for more than one major in the College, that accomplishment can be noted in the memorandum section on your transcript. Requests for certification of multiple majors should be made in the College Office. These additional majors should also be indicated on the Candidacy Card when filing for graduation.

Each major is assigned to one of the three General Education categories (see the Academic Information section): Contemporary Societies (CS), Nature and Environment (NE), and Civilization and Culture (CC). The appropriate category is indicated immediately following the major.

### **ANIMAL SCIENCE**

#### **Majors in Animal Science**

Animal Science (NE)  
Avian Sciences (NE)  
Wildlife and Fisheries Biology (NE)

Advising Centers:  
1149 Meyer Hall, 916-752-6118 (Animal Science only)  
3202 Meyer Hall, 916-752-1300 (Avian Sciences only)

### **Interdisciplinary Major**

Agricultural Science and Management (NE)

### **APPLIED ECONOMIC AND BEHAVIORAL SCIENCES**

#### **Majors in Applied Economics**

Agricultural and Managerial Economics (CS)

Advising Center:  
University House Annex, 916-752-6185

### **Majors and Programs in Behavioral Sciences**

Agricultural Education (CS)  
Applied Behavioral Sciences (CS)  
Design (CC)  
Human Development (CS)  
Landscape Architecture (CC)

Advising Centers:  
101 or 103 AOB 4, 916-752-2244  
152 Walker Hall, 916-752-1165 (Design; Landscape Architecture only)

### **BIOLOGICAL SCIENCES (an Intercollege Division)**

#### **Majors in Biological Sciences**

Biochemistry (NE)  
Biological Sciences (NE)  
Botany (NE)  
Genetics (NE)  
Microbiology (NE)  
Physiology (NE)  
Zoology (NE)

Advising Centers:  
376 Mrak Hall, 916-752-0410 (Biological Science only)  
196 Briggs Hall, 916-752-9696 (Animal Physiology only)

149 Briggs Hall, 916-752-9032 (Biochemistry only)  
 151 Robbins Hall, 916-752-4749 (Botany only)  
 2320 Storer Hall, 916-752-7468 (Zoology only)

## FOOD, NUTRITION, TEXTILE AND CONSUMER SCIENCES

### Majors in Food Sciences

Consumer Food Science (NE)  
 Fermentation Science (NE)  
 Food Biochemistry (NE)  
 Food Science (NE)

Advising Centers:  
 128 Cruess Hall, 916-752-1468 (Consumer Food Science, and Food Science only)  
 2467 Chemistry Annex, 916-752-6168 (Food Biochemistry only)  
 3001 Wickson Hall, 916-752-1909 (Fermentation Science only)



### Majors in Nutrition

Community Nutrition (NE)  
 Dietetics (NE)  
 Nutrition Science (NE)

Advising Center:  
 1151 Meyer Hall, 916-752-2512

### Majors in Consumer Sciences

Fiber and Polymer Science (NE)  
 Textiles and Clothing (CS)

Advising Center:  
 129 Everson Hall, 916-752-4417

## PLANT SCIENCES AND PEST MANAGEMENT

### Majors and Programs in Plant Sciences

Plant Science (NE)  
 Range and Wildlands Science (NE)

Advising Centers:  
 132 Hunt Hall, 916-752-1715

## Major in Pest Management

Entomology (NE)

Advising:  
 394A Briggs Hall, 916-752-0490

## Interdisciplinary Major

Agrarian Studies (CS)

Advising:  
 2039 Wickson Hall, 916-752-0926

## RESOURCE SCIENCES AND ENGINEERING

### Majors in Environmental Studies

Environmental Biology and Management (CS)  
 Environmental Policy Analysis and Planning (CS)

Advising Center:  
 2134 Wickson Hall, 916-752-3088

### Majors in Resource Sciences

Atmospheric Science (NE)  
 Environmental Toxicology (NE)  
 Resource Sciences (NE)  
 Soil and Water Science (NE)

Advising Centers:  
 122 Hoagland Hall, 916-752-1669  
 4111 Meyer Hall, 916-752-1042 (Environmental Toxicology only)

## Major in Agricultural Engineering

(See College of Engineering)

## Interdisciplinary Major

International Agricultural Development (CS)

Advising Center:  
 101 AOB 4, 916-752-2244

## SPECIAL PROGRAMS

### Exploratory Program (non-degree program)

College Academic Advising Center:  
 122 Hoagland Hall, 916-752-0610

Are you unsure what major you really want to pursue? If so, you may wish to register in the Exploratory Program. With the assistance provided by the College's Academic Advising Center and the major advisers and/or Advising Associate in the respective departments and major program offices, you will be able to explore specialization options, develop your decision-making processes, and ultimately select the major best suited to your needs. A major must be declared before you complete 120 units (see Declaration of Major).

For registration purposes, indicate "Exploratory" on your admissions materials. Further information is available from the Academic Advising Center, 122 Hoagland Hall, 916-752-0610.

### Individually Designed Major Programs

College Academic Advising Center  
 122 Hoagland Hall, 916-752-0610

You may design an individual major if you have a specific academic interest not represented by an established major. Such a major requires the selection of interrelated courses totalling 45 upper division units from two or more areas of study. After preliminary consultation about this special program with the master adviser for the Individual major, you then plan your major with at least two faculty advisers. The proposed

program should be submitted to a special committee for review at least four quarters before you plan to graduate.

Additional information may be obtained by contacting the College's Academic Advising Center, 122 Hoagland Hall, 916-752-0610.

## Preprofessional Programs

Preprofessional training requirements for application to professional schools, such as schools of veterinary medicine, administration, law, or medicine, may be satisfied through programs in the College. You should select an undergraduate major on the basis of individual interest and aptitude; no one major will give you an advantage toward admission. Advisers and/or Advising Associate in the College are well-informed about professional requirements and will help you integrate them into your major program. You can obtain more information by contacting the College Office, 228 Mrak Hall; the Office of the Associate Dean—Student Services, School of Veterinary Medicine, 1024 Haring Hall; the Health Sciences Advising Office, South Hall; Pre-Business School Advising Office, 359 Kerr Hall and the Internship and Career Center; or the Pre-Law Advising Office, South Hall.

## Teaching Credentials

Inquiries concerning preparation for teaching credentials in Agricultural Education and Agricultural and Home Economics Education should be addressed to the Department of Applied Behavioral Sciences, University of California, Davis 95616.

For general information on obtaining the teaching credential, see Teacher Credential Programs in the Graduate Division section.

## Student Experimental Farm

A student farm is available to obtain hands-on experience in crop production and to participate in the sustainable agriculture program. For more information telephone 916-752-7645.

## MINOR PROGRAMS

Departments in the College of Agricultural and Environmental Sciences may offer optional minor programs. Completion of a minor is not required for graduation. However, when your total educational objectives cannot be met through a major alone, you may wish to complete the requirements for one or more minor programs and have this certified on your records.

Following is a list of approved minor programs within the College. Requirements for each program can be found under the department or major offering the minor (in parentheses).

Aging and Adult Development (Human Development)  
 Agricultural Entomology (Entomology)  
 Apiculture (Entomology)  
 Biological Sciences (Biological Sciences)  
 Community Development (Applied Behavioral Sciences)  
 Community Nutrition (Nutrition)  
 Energy Policy (Environmental Policy Analysis and

Planning)  
 Entomology (Entomology)  
 Environmental Policy Analysis (Environmental Policy Analysis and Planning)  
 Environmental Toxicology (Environmental Toxicology)  
 Fiber and Polymer Science (Fiber and Polymer Science)  
 Food Service Management (Nutrition)  
 Human Development (Human Development)  
 Insect Ecology (Entomology)  
 International Agricultural Development (International Agricultural Development)  
 Medical-Veterinary Entomology (Entomology)  
 Nematology (Nematology)  
 Nutrition and Food (Nutrition)  
 Nutrition Science (Nutrition)  
 Recreation (Environmental Biology and Management)  
 Textiles and Clothing (Textiles and Clothing)

A minor normally consists of a minimum of 18 units of upper division course work. Only one lower division course may be substituted to meet minimum requirements. Only one course can be used to satisfy a requirement of both your major and your minor. No course can be counted toward minimum requirements for more than one minor program. Transfer units cannot normally be used to satisfy minor requirements. Exceptions in use of transfer units require approval by your adviser for the minor program and the College Committee on Majors and Courses of Instruction. Even though a minor program is not required, you may choose to complete one or more minors in either this college under the guidelines above or the College of Letters and Science according to guidelines in effect for that college.

Satisfactory completion of a minor program must be certified by your major and minor adviser. If you wish to have a minor authorized and entered onto your records, obtain the appropriate form from the Dean's Office, have your minor adviser certify the minor and have your major adviser sign the form, and return the completed form to the Dean's Office. The filing period coincides with that for filing for degree certification (see Academic Calendar in the front of this catalog).

## DEGREE REQUIREMENTS

*It is your responsibility to see that all requirements for graduation are fulfilled. The University and General Education requirements can be found in the Bachelor's Degree Requirements section of the catalog. You must fulfill the Bachelor of Science requirements in a major as prescribed by, or individually designed and approved by, the faculty.*

In brief, the College requirements are as follows, including any restrictions in addition to the aforementioned requirements.

**Unit Requirements:** Of the required 180 units counted toward a degree, 54 UNITS MUST BE UPPER DIVISION WORK. In addition, the following unit limitations apply to all majors:

- Not more than 6 units can be Physical Education 1
- Not more than 20 units can be courses numbered 92, 99, 190C, 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 taken prior to the completion of 84 units)
- Not more than 9 units of professional courses (numbers 300-499) may be used toward the 54 upper division units

**Scholarship Requirement:** As of Fall Quarter 1984, 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 the major for the awarding of the Bachelor's Degree. Each candidate must complete a program of study either as prescribed in (a) a major approved by the Committee on Majors and Courses of Instruction and printed in this catalog, or (b) an individual major approved by the Individual Major Committee. The major program must include a specification of Depth Subject Matter in which the degree student will be required to attain an average grade point of at least 2.000.

**English Composition Requirement:** Before you have completed 120 units, you are required to take two courses: either two courses emphasizing written expression or one course emphasizing written expression and one course emphasizing oral expression. The following UCD courses have been approved for satisfaction of this College requirement:

- One course must be selected from English 1, 3, 20 or 103 (courses with primary emphasis on writing skills).
- One course from one of the courses not selected above or from English 102, 104, Comparative Literature 1, 2, 3; Philosophy 5, 10, or Rhetoric and Communication 1 (courses emphasizing either writing or speaking skills).

**Breadth Requirements (in the major):** Each major requires a certain number of units of breadth—Natural Sciences, Social Sciences, and Humanities. These units are specified by the major program. The broadening effect of any particular course is dependent on your major and general interests. (For example, natural science courses would add more breadth to an Agricultural and Managerial Economics major than they would to a Biochemistry major.) Your faculty adviser and/or Advising Associate has guide-lines for each major showing what courses you should consider.

**General Education:** A General Education course may simultaneously satisfy the campuswide General Education requirement, preparatory subject matter, a breadth requirement or an unrestricted elective required by your major. You should consult your faculty adviser and/or Advising Associate in advance to determine exactly how your General Education courses will apply toward your major.

**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 enrolled at UC Davis. If you have transferred to UCD from another postsecondary institution of higher education (i.e.,

community college, college, or university), you may follow the requirements as stated in any UCD catalog in effect *either* during the three years immediately preceding your transfer to Davis or at the time you first enrolled 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.

**Filing for Graduation:** You must file a Candidacy Card with the Office of the Registrar during the specified filing periods (see Academic Calendar). You must also see your faculty adviser and/or Advising Associate and complete your **Major Certification** (see appropriate college section). This form must be received and evaluated by the Dean's Office before your candidacy for a degree can be finalized.

**Filing Degree Certification:** A Major Certification is completed during the quarter a student plans to graduate. At that time, the adviser and student 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.

## COLLEGE POLICIES AND PROCEDURES

### Study Plan Approval

A Study Plan provides for attainment of specific long-term goals and should allow for (a) the acquisition of prerequisite knowledge for courses to be taken in subsequent quarters, (b) the fulfillment of College and major requirements, (c) a proper balance between the demands of the courses and your ability to master the subject matter, and (d) meeting the minimum progress regulation (see the Academic Information section).

In conjunction with a faculty adviser and/or Advising Associate, 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 the student's individual 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). Your adviser and/or Advising Associate will then notify the Dean that you have filed your plan.

You will 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 a student plans to graduate. At that time, the adviser and/or Advising Associate and student 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.

### Declaration of Major/Change of Major

Students who have not declared a major must do so by the time 120 units have been acquired. Failure to

declare a major at this point will result in a hold on your 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 obtainable at the Office of the Registrar or Dean's Office, and file the petition with the Dean's Office. If you have completed 120 units you must prepare at the same time a study plan with your adviser and/or Advising Associate. You are accepted into a major only after both your adviser and/or Advising Associate and the Dean have approved the Change of Major petition.

**Within the College.** You may change from one major to another within the College by obtaining approval from a faculty adviser and/or Advising Associate of the new major you have selected and the Dean. Admission into a major program may be denied or deferred if your grade-point average in courses that are required for the selected major or your overall grade-point average is below 2.000. Procedures for changing a major within the College are the same as those for declaring a major (see above), and the same conditions apply.

**Accompanied by Change of College.** Petitions for a change of major involving change of college should be filed within the first five weeks of the quarter. A change petition, available at the Dean's Office, must be endorsed by a faculty adviser and/or Advising Associate of the new major you are selecting and signed by the Dean of the college from which you wish to transfer. In addition, admission to the new college will require that Dean's approval. Permission to transfer from one college to another may be denied or deferred if you are in academic difficulty or have less than 2.000 in courses that are required by the new major.

### Multiple Majors

Because of similarity in course requirements for many of the major programs in the College, requests for multiple majors are not normally approved. If you are interested in two or more areas of study, you should consider the options of planning an individually designed major, or of adopting one or more of the minor programs offered by the College to complement your major. You may also request that your transcript note that you have completed all the requirements for study of a major in addition to your selected major.

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 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 another 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.

### Passed/Not Passed Option

This 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 and/or Advising Associate before electing to take a course Passed/Not Passed.

### Credit in Extension Courses

Students in residence may apply a maximum of 9 units of credit earned in some University Extension courses toward the 180-unit requirement *provided* written approval has been obtained from the Dean *prior* to enrollment. Units of credit allowed by the Dean may be less than the number of units listed for a course. No grade points are assigned for courses completed through University Extension.

### Transfer Students

If you transfer to UCD from another institution, the Admissions Office will determine the unit credit you will be awarded for previous work. The College evaluates the credit awarded by the Admissions Office and determines how many units will be counted as upper division work. Your faculty adviser and/or Advising Associate then determines how the credit applies toward completion of the major requirements.

In order to make program planning easier for transfer students, the major requirements listed in the Programs and Courses section of this catalog have preparatory subject matter set out in a special category. These preparatory courses may be taken at the University of California or elsewhere. You can generally determine the area of knowledge covered by a specific requirement by reading the course descriptions. You need not present identical courses, only ones that have substantially similar content. If you are attending



a community college, consult your counselor to determine which community college courses are appropriate and acceptable for fulfilling College of Agricultural and Environmental Sciences requirements.

If you have questions as to the best way to prepare for transfer to the Davis campus, you are encouraged to write directly to the Dean's Office or the Advising Center responsible for your intended major or plan a visit to the campus to discuss your program with a faculty adviser and/or Advising Associate. Simultaneous enrollment at another institution requires prior approval by the Dean of the College.

### **Withdrawal**

A student may be permitted to withdraw from the College for emergency reasons or for good cause. Consultation with the Dean's Office is required prior to filing the petition to withdraw. Also refer to the University policy and procedures for withdrawal.

## **HONORS**

### **Dean's Honors List**

The Dean's Honors List, published at the end of each quarter, includes the names of all students in the College of Agricultural and Environmental Sciences who have completed at least 12 units of letter-graded courses on the Davis campus during any quarter and who have a grade-point average equal to or higher than the minimum grade-point average attained by the upper 16 percent of students registered in the same class and college during the preceding quarter.

### **Honors at Graduation**

Graduating students who are completing their majors with distinction may be recommended for honors, high honors, or highest honors. Recipients will have this distinction noted on their records and diplomas.

Honors at graduation will be awarded according to the conditions specified in the Academic Information section of this catalog.

### **College Medal**

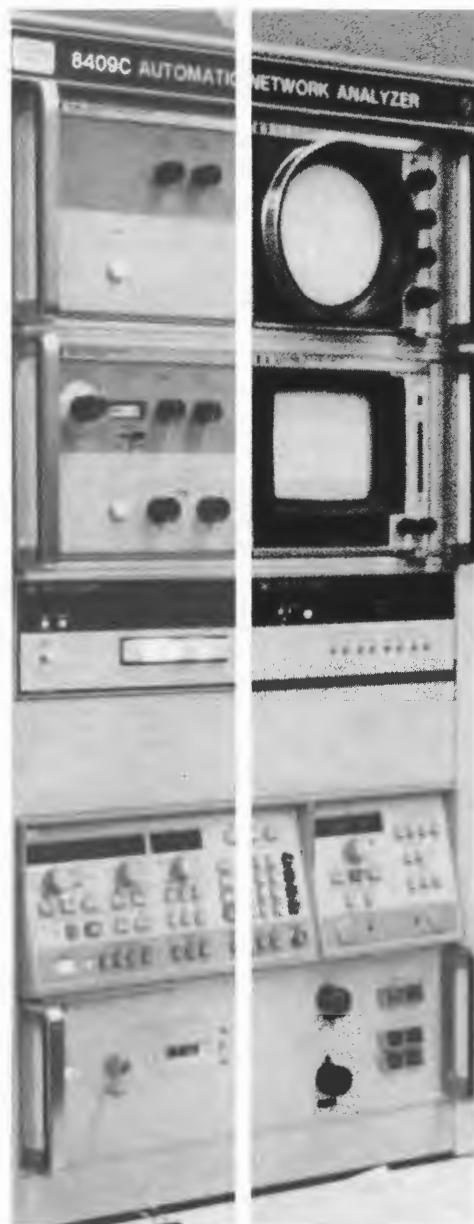
Each year the outstanding graduating senior in the College is awarded a silver medal, known as the "Agricultural and Environmental Sciences Medal." Scholastic excellence (in a minimum of six quarters at UC Davis) is the primary basis for choosing the recipient.

### **Scholarships**

To encourage capable young men and women to pursue careers in the agricultural and environmental sciences, many companies and private individuals have established scholarships restricted to students in this college. You are encouraged to apply for these scholarships if you have a high scholastic standing and demonstrate exceptional performance. Certain scholarships also require proof of financial need. Information is available from the Scholarship Office, or from the College Office, 228 Mrak Hall. (See also Scholarships.)

# College of Engineering

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Engineering is the profession in which the physical, biological, and social sciences are applied in a practical way for the benefit of humankind. As an engineering student, you will learn to observe and describe problems related to technology and human needs and to seek useful solutions to these problems. 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.

Fifteen undergraduate engineering curricula, including four formal double-major programs, are offered at Davis. These are all four-year programs that lead to the degree of Bachelor of Science in Engineering. Within each curriculum, you may choose an area of specialization by selecting suitable technical elective courses.

The following engineering curricula are accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology: Aeronautical Science and Engineering, Agricultural Engineering, Chemical Engineering, Civil Engineering, Computer Science and Engineering, Electrical Engineering, and Mechanical Engineering.

The four-year undergraduate program is divided into two parts. The first part (the Lower Division Program) is made up of mathematics, physics, chemistry, humanities and social sciences courses, and certain introductory engineering courses. There are four Lower Division Programs in Engineering. The second part of the curriculum, the Upper Division Program, is made up of elective courses and a group of required

technical courses pertinent to your major. Most of your senior year is elective, to be divided between technical and non-technical courses. Since practical engineering experience gained during your undergraduate years is also useful, you are encouraged to participate in engineering internship programs.

It takes more than four years of schooling to learn all you need to know about any profession. The objective of the undergraduate programs in engineering, therefore, is to form an appropriate foundation for your lifetime of learning. Extended learning after graduation—on-the-job experience, individual study, extension courses, or formal graduate study—is an essential part of an engineering education.

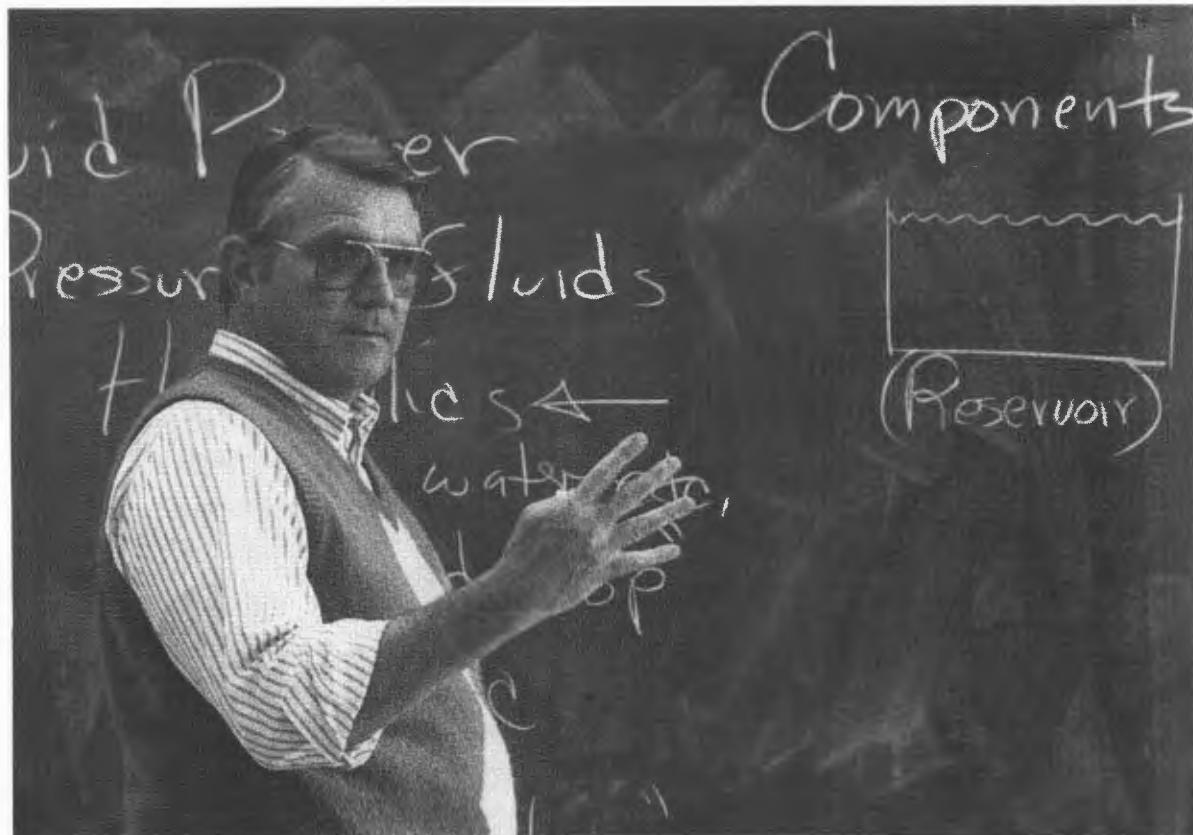
For information on graduate programs leading to the Master of Engineering, Doctor of Engineering, Master of Science, and Doctor of Philosophy degrees, or on Graduate Certificate Programs, refer to Graduate Study in Engineering at the end of this section.

## ADMISSION TO THE COLLEGE OF ENGINEERING

### Admission to Freshman Standing

There are no special requirements for admission to the College of Engineering other than the general University requirements. It is recommended, however, that you take the following subjects (or integrated courses covering substantially equivalent material) during high school:

Subject Areas	Years
Algebra	2
Plane geometry	1
Trigonometry	1/2
Analytic geometry	1/2
Chemistry and/or physics	1



These subjects are prerequisite to certain basic courses in the freshman engineering program. You will be required to make up equivalent work if you are admitted without this preparation. As a result, your graduation could be delayed.

You must select a major before admission, and you may be limited in your freedom to change majors within the College once you have been admitted.

### Advanced Placement Examination

Credit toward the total unit requirement for the degree is awarded for CEEB Advanced Placement Examinations satisfactorily passed, as indicated in the table shown in the Academic Information section of this catalog. As noted in the table, these units may be used to satisfy specific graduation requirements in the College of Engineering.

### Admission to Advanced Standing

While it is possible for community college students to transfer to UC Davis after completing only the freshman year, the highest enrollment priority is given to applicants who have completed the entire lower division program. Once you have completed the lower division engineering curriculum at a California community college, your studies at Davis can be completed within two academic years. Questions about community college programs should be directed to your school counselor, or you can contact the UC Davis College of Engineering Undergraduate Office directly. (For information on admission to the University in advanced undergraduate standing, refer to the Admission section of this catalog.)

If you are admitted with *fewer than 84 quarter units* of college work (56 semester units), you are classified in lower division standing, and must complete one of the four Lower Division Programs listed under Engineering in the Programs and Courses section of this catalog. You are advanced to upper division standing after completing 84 units.

If you are admitted with *84 or more quarter units*, you are classified as having upper division standing, but you are required to complete the minimum number of quarter units in the subject areas specified below before your Lower Division Program is considered complete. You may, however, start your Upper Division Program while completing your Lower Division Program.

Subject Areas	Minimum Quarter Units
<b>Mathematics</b> (calculus, differential equations, vector analysis) .....	18
<b>Physical and biological sciences</b> (at least 10 units must be in general chemistry and at least 12 units in physics for engineering and science students).....	26
<b>Engineering</b> (lower-division subjects such as graphics, properties of materials, surveying, computer programming, statics, and circuit theory. Chemical Engineering majors may elect to take only 12 units of engineering in their Lower Division Program).....	15
<b>Written and oral expression</b> (courses that are equivalent to English 1 and Rhetoric and Communication 1 or 3) .....	8

**Humanities-social sciences** (courses must be selected from a list of course groups approved by the Committee on Undergraduate Study).....9

**Specified subjects** (Chemical Engineering majors should take quantitative analysis and one course in organic chemistry with laboratory during their sophomore year; Agricultural Engineering—Forest Engineering option majors should take courses in biology, botany and statistics; Agricultural Engineering—Food Engineering option majors should take courses in Microbiology and Biology.).....8

**Total** .....84

Once you have completed the Lower Division Program and completed these specified subject area requirements, you need not take additional lower division courses, except those that are prerequisite to upper division courses in your curriculum.

The minimum number of required units in the Lower and Upper Division Programs varies, with the curriculum, from 180 to 215.

When there are more applicants than space available in the College, priority is given to transfers from California community colleges who have completed the lower division program for engineering with a high grade-point average. You must select a major before admission, and once admitted, you may be limited in your freedom to change majors within the College.

Engineering is closed to Limited Status, Special Status, and Second Baccalaureate applicants.

### TRANSFER FROM ANOTHER UCD COLLEGE

You may only submit petitions for a transfer into the College of Engineering from another UCD college if you 1) are in good academic standing and are making minimum progress, 2) have completed at least 40 units as a registered student on the Davis campus, 3) have successfully completed Mathematics 21A, 21B, and 21C and Physics 8A (or their equivalents) on a letter grade basis, and 4) have the minimum UC GPA specified for the year in which you wish to transfer.

You must declare a specific major at the time you petition to transfer and must have the minimum GPA specified for transfer into that major in that year. Refer to the section on Academic Information for details on filing petitions, and consult the Engineering Undergraduate Office for details on minimum GPAs for specific majors.

### ACADEMIC ADVISING

In establishing the College of Engineering's undergraduate programs, we have made every effort to provide for maximum flexibility consistent with rigorous preparation for professional practice or graduate study. The key to developing a flexible program for each student is an effective system of advising.

As an undergraduate in the College of Engineering you are assigned to a faculty member for academic and career advising. Initial adviser assignments are made through the Engineering Undergraduate Office before your first term on campus. Engineering majors usually keep the same faculty adviser throughout the

undergraduate years, but you may change to a new adviser of your choice whenever you wish. However, you must keep the Undergraduate Office informed of your adviser selections.

You are expected to meet individually with your faculty adviser at least once each quarter. New freshmen are required to meet with their advisers each quarter of the first year of enrollment, and new advanced standing transfer students are required to do so for the first quarter. To facilitate dialogue with your adviser on your program of study, we provide Advising Worksheets. (Extra copies are available in the Engineering Undergraduate Office). You should work out your lower division worksheet early in your freshman year, get it signed by your adviser, and then review it regularly with your adviser. Similarly, you should work out your upper division worksheet early in your junior year, get it signed by your adviser, and then review it regularly with your adviser. Faculty advising is complemented by a peer advising system.

## MAJORS

Majors (curricula) in the College of Engineering are  
Aeronautical Science and Engineering

Agricultural Engineering

    Aquaculture and Fisheries Engineering option

    Food Engineering option

    Forest Engineering option

Chemical Engineering

Civil Engineering

Computer Science and Engineering

Electrical Engineering

Materials Science and Engineering (MS&E)

    Chemical Engineering/(MS&E)

    Civil Engineering/(MS&E)

    Electrical Engineering/(MS&E)

    Mechanical Engineering/(MS&E)

Mechanical Engineering

Although you are required to select a major before your admission, after your first year you are encouraged to make use of the advising and counseling available to students if you are uncertain about persisting in your choice of a major. Because of over-enrollment, certain restrictions have been placed on changes of major within the College, but information and advice are available from faculty and student advisers and the associate dean for undergraduate studies. The Internship and Career Center, the Advising Services Office, the Counseling Center, and other sources listed in the index under Advising are also good places to seek assistance.

## MINORS

The College of Engineering does not offer minors in engineering fields; however, engineering students may choose to complete one minor offered by either the College of Agricultural and Environmental Sciences or the College of Letters and Science. (See the minor program list in the specific college section.) A minor normally consists of at least 18 units of upper division course work.

You must plan a minor program carefully with the appropriate adviser(s) within the college offering the minor of your choice. Minor declaration forms are available in the appropriate college dean's office. The

filings period for declaring a minor coincides with that for filing for degree certification (see Calendar).

Minors are not required and may not be the basis for petitions to substitute classes for approved Humanities-Social Sciences (HSS) electives.

## PLANNING YOUR PROGRAM

A number of freshman engineering courses are designed to describe the engineer's role in society and to show the similarities and differences among various engineering branches. Included are

- Engineering 3 (*Introduction to Engineering Systems*)
- Agricultural Engineering 1 (*Introduction to Agricultural Engineering*)
- Chemical Engineering 1 (*The Scope of Chemical Engineering*)
- Civil Engineering 1 (*The Civil Engineer in Society*)
- Electrical and Computer Science Engineering 1 (*Introduction to Electrical and Computer Engineering*)
- Mechanical Engineering 1 (*Mechanical Engineering*)

You may wish to take one of these courses to assist you in your decisions about your program.

*You are held responsible for planning your program.* But that does not mean you are simply on your own. Your faculty adviser, with whom you are strongly urged to consult prior to registration **each quarter**, is the primary source of assistance. The Undergraduate Office of the College is willing to assist, as are the many advising offices throughout the campus. The Advising Worksheet described under Academic Advising is especially helpful for planning.

Specific degree requirements for the various engineering curricula are listed under Engineering in the Programs and Courses section.

The minimum number of required units varies with the curriculum and ranges from 180 to 215. Programs normally require a minimum of 12 to 14 quarters of study averaging 15 units each. A regular full-time student must satisfy the University's requirements for minimum progress.

Sample arrangements that list the Lower-Division and Upper-Division Programs in a quarter-by-quarter sequence may be found in the *College of Engineering Bulletin*, available from the Engineering Undergraduate Office.

## Program Flexibility

You should complete all prerequisite courses during your first two years, but the remaining non-prerequisite natural science courses and Humanities-Social Sciences courses are requirements for graduation, and can be scheduled to suit your individual study program.

In planning your four-year program, be sure to observe course prerequisites in order to avoid a delay in graduation. Course prerequisites are specified to help you avoid courses for which you are unprepared



and to help the instructor establish a starting point for a given course. The prerequisites for any course may be waived by the course instructor, *for good cause*, for individual students.

### Course Priorities for Freshmen

Course priorities for the first quarter of your freshman year are suggested below.

- Mathematics 11, Analytic Geometry (if not completed in high school)
- Mathematics 21A, Calculus (if not completed in high school)
- English A (if the Subject A requirement is not yet otherwise satisfied)
- Engineering 3 or 4; English 1 or 3, or Comparative Literature 1, 2, or 3; Chemistry 1A or 4A; Rhetoric and Communication 1 or 3; or Humanities-Social Sciences and General Education electives

If you have not satisfied the Subject A requirement before entering the University, you must do so as early as possible during your first year of residence. If you have not done so after three quarters of enrollment, you will not be eligible to enroll for a fourth quarter.

*You may not receive General Education credit for courses taken before you have satisfied the Subject A requirement.*

If you are in the Chemical Engineering or the Chemical Engineering/Materials Science and Engineering major, or are considering the possibility of petitioning to transfer to this major, you should take Chemistry 4A-4B-4C in your freshman year.

### Expanded Course Outlines

In planning your program, you may consult the file of expanded course outlines for all courses offered by the various engineering departments at the Undergraduate Office of the College.

### Special Courses

**Variable-Unit Courses:** Refer to the Academic Information section of this catalog for unit limitations on special study, internship, and other variable-unit courses.

**Internship Courses:** Internship courses numbered 92 and 192 are designed to provide practical and applied experience. Further information is available from your adviser, the respective Engineering department offices, or the Internship and Career Center.

**University Extension Courses:** Appropriate courses taken through University Extension may be used for degree credit. Simultaneous enrollment in resident courses and Extension courses requires *prior approval* by the Associate Dean for Undergraduate Studies of the College. Such approval will be given only for a limited number of credits. No grade points are assigned for courses completed in University Extension.

## DEGREE REQUIREMENTS

YOU ARE RESPONSIBLE FOR PLANNING YOUR PROGRAM AND FOR SATISFACTORY COMPLETION OF DEGREE REQUIREMENTS.

University requirements and the campus General Education requirement for the bachelor's degree are explained in the Bachelor's Degree Requirements section of this catalog.

For the General Education requirement, all majors in the College of Engineering are in the **Nature and Environment** area. Therefore, courses used to satisfy the general education requirement must be chosen from the remaining two areas, **Civilization and Culture** and **Contemporary Societies**. The relationship of these courses to the Humanities-Social Sciences electives is discussed under Electives in this section.

### Unit Requirements

Each candidate for the degree of Bachelor of Science in Engineering must satisfactorily complete an approved curriculum in engineering. Each curriculum consists of a specified Lower Division Program (or an approved equivalent program for students who transfer into the College with 84 or more quarter units) and a specified Upper Division Program. Detailed requirements for the approved curricula are given in the Programs and Courses section of this catalog.

You may, for good cause, request a modification of particular degree requirements by submitting a student petition. These petitions, which are available in the Undergraduate Office, can be a valuable aid in solving individual program conflicts or other special problems. Such petitions are subject to approval by the Undergraduate Study Committee, a body of six professors and six (non-voting) students. A negative decision by the Committee may be appealed to the College faculty for action at a regular meeting.

### Residence Requirement

In addition to the University residence requirement, you must complete at least 35 of the final 45 units characteristic of your curriculum in engineering while registered in the College.

### Scholarship Requirement

In addition to meeting the University scholarship requirement, you are required to maintain a 2.0 grade-point average for all upper division required courses in your major.

## English Composition Requirement

After completing 84 quarter units, you must satisfy the upper division English Composition requirement in one of three ways:

1. by passing the English Composition Examination administered by the College of Letters and Science. (You should take it early in your junior year and must take it before your last quarter. Units of credit are not given for passing this examination.)
2. by completing English 103A with a grade of C- or higher after completing 84 units of college work.
3. by successfully completing English 102 adjunct to Chemical Engineering 155A or 155B (*Chemical Engineering and Chemical Engineering/Materials Science and Engineering majors only*).

This requirement is in addition to the expository writing course requirement (English 1 or 3, or Comparative Literature 1, 2, or 3) specified in the Lower Division Programs.

During the 1990-91 academic year, the English Composition Examination will be offered on the following three Saturdays: October 27, February 2, and April 27. Sign-up rosters will be posted on the College of Letters and Science's bulletin board, Mrak Hall foyer, Monday through Thursday just preceding each Saturday examination date. You must sign up, in person, by Thursday. You must obtain the English Composition Examination form, available at the UCD Bookstore, to take the exam.

## Engineering Design Requirement

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. You must take at least 24 quarter units of such design course work through a combination of required and restricted elective courses. Specific comments about design are included in individual curricula descriptions. *You should also review the design content of your program with your adviser in the course of completing the upper division advising worksheet.*

## Electives

There are four kinds of elective courses in the engineering curricula: *Humanities-Social Sciences, General Education, technical, and unrestricted*. Transfer students have an additional set of electives: *Physical and Biological Sciences electives*.

**Humanities-Social Sciences electives:** Because engineers are significant agents of social change, they must be sensitive to the human setting in which that change takes place. The Humanities-Social Sciences (HSS) electives are emphasized within the engineering curricula to increase your awareness of the human and societal implications of engineering practice. The humanities include subject areas such as literature, philosophy, history, and the fine arts. The

social sciences include areas such as anthropology, political science, sociology, psychology, and economics.

You must take at least 24 quarter units from subjects in the humanities and social sciences areas. Subjects that are vocationally oriented or skills oriented, such as management and accounting, or that contain a preponderance of scientific or mathematical content, are not suitable for HSS credit even though a course may be offered by a department ordinarily classified as a humanities or social science department. Foreign language courses must stress literature, not skills, and fine arts courses must emphasize the history and appreciation of forms of expression, not development of performance or other technical skills. You may petition to have a non-literature course in a foreign language which is not your native language count as a humanities course. You may petition for HSS credit for 92, 98, 99, 192, 197, 198, and 199 courses in appropriate cases. If you repeat any of the courses which may be repeated for credit, not more than 4 units in any such courses can be counted toward your HSS requirement.

Your HSS electives should be designed to include a comprehensive and coherent set of courses and may, in some cases, be integrated with your General Education electives, as described in the next section. HSS electives must be selected from the following list.

- Afro-American Studies 10, 15, 80, 100, 101, 107, 110, 120, 121, 123, 133, 145A, 145B, 150A, 150B
- Agricultural Economics 1, 100A, 100B, 120, 150, 169
- American Studies 1A, 1B, 1E, 1F, 2, 10, 45, 101A-H, 120, 125, 130
- Anthropology 2, 3, 4, 101, 110, 112, 114, 120 through 149, 170 through 179
- Applied Behavioral Sciences 1, 2, 17, 18, 151 through 154, 157, 161 through 165, 170, 171, 172, 175 through 178, 190
- Art 1A, 1B, 1C, 1D, 10H, 10S, 15, 20, 25, 150 through 188C, 190 (also Art 1AG, 1BG, 1CG, 1DG, and 25G when taken concurrently with Art 1A, 1B, 1C, 1D, and 25)
- Asian American Studies 1, 2, 100, 101, 110, 111, 112, 130, 150, 155
- Chicano Studies 10, 20, 102, 132
- Chinese 10, 11, 104 through 107, 109A-I, 111 through 116, 130, 131, 132
- Classics 4A, 10, 17A, 17B, 17C, 20, 140, 141, 142, 143, 174, 175
- Comparative Literature 1 through 53B, 135 through 170
- Consumer Science 100
- Design 140, 142A, 142B, 143, 144
- Dramatic Art 15 (but not 15L), 20, 70, 115, 150 through 159
- East Asian Studies 113
- Economics 1A-1B, 100, 101, 105, 106, 110A through 136B, 151A through 175
- Education 110, 117, 118, 120, 122, 123, 130, 132, 142, 145, 151, 153
- English 3, 30A, 30B, 45, 46A, 46B, 46C, 105C, 107, 110A through 189
- Environmental Studies 101, 133, 160 through 167, 169
- French 25, 45, 101, 102, 103, 107, 112 through 123, 140 through 150, 162

Geography 2, 5, (2G, 5G when taken concurrently with 2 or 5), 6, 10, 50, 104, 121, 122A through 127, 141 through 162, 170 through 173, 175  
German 48, 50, 51, 52, 106, 110 through 133  
History 1 through 90A, 101 through 191B, 193 through 196B  
Human Development 15, 100A through 103, 110, 130, 131, 132, 151, 160  
Integrated Studies 2A, 2B, 2C, 2D, 2E, 3A, 3B, 3C, 3D, 3E, 8, 8B, 8C (Open only to students accepted to the Integrated Studies Program)  
International Agricultural Development 10, 103  
Italian 25, 107 through 139C  
Japanese 10, 25  
Landscape Architecture 140  
Linguistics 1, 100, 102, 113, 115, 120, 138, 150  
Medieval Studies 20A, 20B, 20C, 120A-F  
Music 3A, 3B, 4A, 4B, 4C, 5A, 5B, 5C, 10, 24A through 28, 107A, 107B, 107C, 108A, 108B, 109, 110A, 110B, 110C, 110D, 113A, 113B, 121, 122, 129  
Native American Studies 1, 10, 32, 33, 55, 70, 101 through 161, 180, 181A, 181B, 181C, 188, 190, 191  
Nutrition 20  
Philosophy 1, 10A-G, 14, 18, 21, 22, 23, 24, 100 through 106, 109, 114A through 123, 137, 143 through 176, 190  
Physical Education 36A, 36B  
Political Science 1 through 7, 100 through 113, 115 through 190  
Portuguese 103A-118  
Psychology 1, 16, 112, 114, 115, 120, 130, 131, 132, 135, 136 through 150, 165, 168, 171, 177, 183  
Religious Studies 1, 2, 4 through 75, 100 through 172  
Rhetoric and Communication 10, 42, 103 through 143, 152  
Russian 30, 41, 42, 120 through 154  
Scandinavian 110, 111  
Sociology 1, 2, 3, 25, 102, 107, 110 through 165B, 170 through 185  
Spanish 34, 35, 100, 103A through 109, 111 through 129, 134, 135, 136, 138, 149, 150, 151  
Textiles and Clothing 107  
Women's Studies 50

**General Education electives** are used to satisfy a campus requirement and are chosen from the list in the Bachelor's Degree Requirements chapter of this catalog. Since all engineering majors are in the Nature and Environment GE area, you must fulfill the campus requirement by taking courses in the Civilization and Culture and Contemporary Societies areas which broadly overlap Humanities and Social Sciences, respectively.

You should note that the requirement of 24 quarter units of Humanities and Social Science (HSS) course work is a College of Engineering requirement and is in addition to the campus General Education (GE) requirement of a fixed number of courses (e.g., six courses for a student entering UCD as a freshman). You may satisfy the HSS and GE requirements simultaneously, provided that you take the courses that are listed on both the list of HSS courses above and the list of GE courses in the Bachelor's Degree Requirements chapter of this catalog. In general, a good aca-

demic strategy is to satisfy the campus GE requirement first and then to satisfy any remaining HSS requirements by taking courses from the HSS list. In this way, you can benefit from the breadth and depth of course coverage inherent in the GE program structure. (For example, courses from areas outside of your major field of study are required and you must take course work at both the introductory and non-introductory levels.)

In satisfying the GE requirement, note that (a) *you must take GE courses for a letter grade* and (b) *you must fulfill the Subject A requirement before you begin your GE course work*. In consultation with your academic adviser, you should attempt to design a comprehensive and coherent set of courses using both the HSS electives and GE electives.

**Technical electives** permit you to tailor a program to your own academic and career objectives. For some, the technical electives offer the opportunity to prepare for a specific occupation. For others, they offer an opportunity to broaden a background in the sciences and engineering.

You may receive technical elective credit up to a maximum of 6 units for any combination of engineering courses numbered 190C, 192, 197, 198, and 199. Academic credit for 199 courses is limited to a maximum of 5 units for each substantially different project. Academic credit for engineering internship courses (192s) is limited to a maximum of 5 units per quarter.

With the exception of the following courses, all upper division courses in engineering, physics, chemistry, mathematics, and statistics may be taken as technical electives. The courses which may *not* be used are:

Applied Science Engineering 137 (restricted to one unit of technical elective)  
Physics 137 (restricted to one unit of technical elective), 194H, 195, 197T, 198, 199  
Chemistry 194H, 197, 198, 199  
Mathematics 192, 197TC, 198, 199  
Statistics 102

In addition to chemistry, engineering, mathematics, physics and statistics courses, the following courses may be taken as technical electives:

Agricultural Economics 113, 140, 147, 148, 157, 176  
Agricultural Engineering Technology 161A, 161B  
Animal Science 1, 105, 133  
Art 121A  
Atmospheric Science 105, 121A, 121B, 124, 133, 149A  
Biochemistry and Biophysics 101A, 101B  
Biological Sciences 1A, 1B, 1C  
Chemistry 1C, 4C, 5, 8A, 8B  
Economics 11A, 11B  
English 104  
Environmental Biology and Management 110  
Environmental Studies 100, 116, 128, 128L, 150A, 150B, 150C, 151, 160, 167, 168A, 168B, 169, 173, 178, 179  
Environmental Toxicology 131  
Food Science and Technology 100A, 100B, 102, 104, 108, 111, 131, 150  
Genetics 100  
Geography 106, 110

Geology 1, 1L, 17, 50, 50L, 60, 105, 116, 117A, 117B, 123, 124, 134, 150A  
 Microbiology 2, 102, 130A  
 Physiology 2, 110, 120B, 120E, 149  
 Resource Sciences 100, 131  
 Soil Science 100, 102, 107, 120  
 Textiles and Clothing 100  
 Vegetable Crops 101  
 Water Science 41, 103, 104, 122, 141, 142, 150, 154, 160, 172, 180  
 Wildlife and Fisheries Biology 120, 121

You are urged to discuss the selection of technical elective courses with your academic adviser.

**Unrestricted electives.** You may count any course for which University credit is allowed as an unrestricted elective in the engineering curricula.

**Physical and Biological Science electives.** Transfer students who have not completed the Physical and Biological Science electives requirement should choose courses from the following list of areas:

Atmospheric Science  
 Biological Science  
 Botany  
 Chemistry  
 Biochemistry  
 Geology  
 Microbiology  
 Physics  
 Physiology  
 Zoology

### Degree Requirement Statements

As engineering is a rapidly developing profession, curricular changes are made by the faculty from year to year. In order to ensure that you benefit from these changes, the College of Engineering has established a policy that you must fulfill the degree requirements stated in the catalog for the year in which you complete degree work or in the catalog for the year immediately preceding.

### Degree Check

You should use the Degree Requirement Check sheets for each of the curricula for monitoring your progress toward a degree. The Undergraduate Office will prepare only one *unofficial* degree check for you (preferably at the end of your junior year). In order to have this degree check prepared, you must submit a signed Degree Check Request. You can obtain further information concerning this service and forms for requesting it in the Engineering Undergraduate Office.

## GRADING

### Passed/Not Passed Option

While registered in the College of Engineering, you may enroll in a maximum of one course per quarter in which you choose the Passed/Not Passed (P/NP) grading option. Courses that are graded *P/NP only* may be taken simultaneously with the courses for which you exercise the Passed/Not Passed option.

In the engineering curricula, only courses taken to satisfy (a) the unrestricted electives requirements, or (b) the college Humanities-Social Sciences electives and

the English and rhetoric requirements, or (c) the technical electives requirement may be taken on a Passed/Not Passed basis. *All other courses must be taken for a letter grade.* Humanities-Social Science courses that you plan to offer in fulfillment of the *campus General Education* requirement must be taken for a letter grade.

You must meet the following conditions to exercise the Passed/Not Passed option:

- be in good academic standing (not on probation or subject to dismissal)
- carry at least 12 units, including the course to be taken P/NP, in that quarter
- have a P/NP petition approved by the Associate Dean for Undergraduate Studies or a designated representative

## HONORS

### The Dean's Honors List

The Dean's Honors List is posted quarterly in the glass case outside the College of Engineering Undergraduate Office. This list includes the names of all undergraduate engineering students who have completed at least 12 units during the preceding quarter (exclusive of courses taken on a Passed/Not Passed basis) and who have achieved 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 College at the same class level during that quarter. A notation is made on your transcript each time you qualify for the Dean's Honors List.

### Honors at Graduation

Graduating students in the College of Engineering who have achieved distinguished scholarship while at the University may qualify for honors, high honors, or highest honors. The names of these students are given in the Commencement Program in June, and this distinction is noted on their records and diplomas. Honors at graduation will be awarded to students who have completed at least 45 units of work at the University with a grade-point average that places them in the appropriate top percent of the graduating class in the College of Engineering. (See Honors and Prizes in the Academic Information section.)

### College Medal

Each year outstanding senior students in engineering are recommended by the faculty of the College as nominees for the College of Engineering Medal. Academic excellence is the primary basis for selecting the recipient of the award.

## GRADUATE STUDY IN ENGINEERING

The following departments and divisions offer courses of study leading to both the Master of Science and Doctor of Philosophy degrees. Programs in these departments are particularly appropriate for those wishing to prepare for careers in teaching, research, or analytical design.

- Aeronautical Science and Engineering
- Agricultural Engineering



- Applied Science (Davis-Livermore)
- Chemical Engineering
- Civil Engineering
- Computer Science
- Electrical Engineering and Computer Science
- Materials Science and Engineering
- Mechanical Engineering

Professional programs emphasizing design and leading to the Master of Engineering and Doctor of Engineering degrees are offered by the following departments:

- Agricultural Engineering
- Civil Engineering
- Electrical Engineering and Computer Science (Doctor of Engineering degree *only*)
- Mechanical Engineering

Graduate students in engineering are permitted wide latitude in selecting courses and research or design subjects at both the master's and doctoral levels. A purposeful and well-integrated course of study is planned with the help of an adviser or guidance committee. A student is required to enroll in the departmental seminar each quarter while in residence.

More general information may be found in the *Graduate Announcement*, obtainable from the Dean of the Graduate Division. Detailed information on graduate study in engineering is contained in the *College of Engineering Bulletin*, available from the College, Office of Graduate Affairs.

### **Instructional Television Program**

Many courses in engineering, predominantly graduate-level courses, are available on the campus television network at receiving sites in Livermore. Those interested in TV classes should contact the Instructional Television Program, 916-752-2850.

### **Graduate Certificate Program**

For engineers who already have a degree, the College of Engineering offers a Graduate Certificate Program. This program consists of course work in selected engineering subjects, and requires 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 program are

- 15 or 16 units of specified graduate course work, or a combination of specified graduate and undergraduate course work
- Admission to the Graduate Division

Further information on the Graduate Certificate Program may be found in the *College of Engineering Bulletin*.

# College of Letters and Science

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The College of Letters and Science offers programs of study that expose a student to the worlds of human experience, of ideas, of artistic accomplishments, and of matter and things. These four worlds are the domains of the social sciences, the humanities, the fine arts, and the natural sciences, respectively. Although separate and distinct to the casual observer, these areas are interconnected and may be studied in a coherent curriculum. It is within this curriculum that you will be able to explore a variety of academic fields, engage in the pursuit of fundamental knowledge primarily for its own sake, and gain the capacity for independent study and thought.

A well-balanced liberal education, including in-depth study of a major field, should prepare you for a satisfying life, whatever your career. And since more and more career opportunities depend on the completion of a basic letters and science curriculum, such an education will also have a vocational value.

The main emphasis in the College remains, however, on the ends of living rather than on the means. Undergraduate education in the College stresses breadth rather than specialization.

Within the specific standards of scholarship and unit distribution that the College has established for its programs of study, there are three groups of requirements crucial to the realization of the College's educational goals: the English Composition Requirement, the Foreign Language and Area Requirements, and the Major Requirements.

The **English Composition Requirement** is designed to ensure that you are well versed in the skills of written communication.

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 **Major Requirements** enable you to gain intellectual depth and competence in a selected area of study.

Bachelor of Arts (A.B.), Bachelor of Science (B.S.) and Bachelor of Arts and Science (B.A.S.) degrees are offered by the College. The B.A.S. degree is for those who have two majors, one normally leading to an A.B. degree and the other to a B.S. These degrees are conferred upon your completion of the University's requirements, the General Education requirement, and the College's breadth and major requirements detailed in the Bachelor's Degree Requirements section of this catalog.

**Every student is personally responsible for seeing that these graduation requirements are met. (Changes in graduation requirements, other than those in the major, adopted after publication of the General Catalog, are posted on the Letters and Science bulletin board opposite 175 Mrak Hall.)**



## STUDENT SERVICES

Information:  
Letters and Science Advising Office  
150 Mrak Hall  
752-0392

The primary function of the Letters and Science Advising Office is to assist students with questions concerning academic matters and program planning. The deans and academic counselors staff an advising service designed especially to assist undeclared students with selecting a study program and in their search for a major. All students are welcome, however, to come in for general academic advising.

This office can also help you with questions concerning College requirements, scholarship (probation and disqualification), and other academic matters. Teams of academic counselors, staff and peer advisers are available between 8:00 a.m. and 5:00 p.m., Monday through Friday to answer your questions, act on petitions, and provide knowledgeable advice. Counselors and deans are regularly available to students by appointment as well.

The Dean's Office also performs a number of regular functions:

- Determines how your transfer credits from other institutions apply towards completion of breadth and unit requirements for the bachelor's degree (applicability of transfer credit toward the major is determined by your major faculty adviser)
- Provides a Status Card outlining the way in which transfer credit satisfies College and University requirements
- Provides workshops and individual review to identify remaining College requirements (See Degree Check at the end of this section.)
- Acts on petitions requiring the Dean's approval, e.g., petitions for declaration or change of major;

change of study list after established deadlines; waiver of minimum progress requirements; permission to take 200-, 300-, and 400-numbered courses for degree credit; withdrawal; reentry on probation or after completion of 120 units

- Reviews the records of students who are subject to disqualification and decides whether such students may continue on academic probation or will be dismissed

## ADVISING

### Faculty Advising

Given the range of programs and courses offered within the College of Letters and Science, good advice is essential if students are to design an educational program that will best fit their needs and individual goals.

In the College of Letters and Science, the relationship between student and faculty adviser is largely a voluntary bond. Thus, the effectiveness of advising depends both on the perceptiveness of the adviser and the initiative of the student.

An adviser can assist you not only in meeting minimal degree requirements, but also in taking maximum advantage of the resources available in the University. Your transcripts from other colleges (your own copy is necessary) should be made available to your adviser. You are encouraged to talk to faculty advisers in different fields to enable you to make educational decisions on the basis of the broadest possible body of information and ideas. Although degree requirements may appear many and complex, they leave substantial room for individualization of study programs. With the help of faculty advisers, you can explore many areas—some in depth—while still progressing toward your major degree objectives.

Remember, it is your responsibility to maintain regular contact with your faculty adviser. A good relationship is developed by meeting frequently and discussing honestly and thoughtfully your evolving interests, your academic and experiential background and your goals. A conference at least once a quarter is especially desirable for new students during their first year in the College and for seniors during the final quarters preceding graduation.

Feel free to come to the Letters and Science Advising Office for consultation on any academic matter.

**Advising Checkpoints.** You are required to consult with your faculty 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 adviser a proposal for a quarter-by-quarter program of courses showing how you will meet your educational goals and the graduation requirements. You must also have declared a major by this time (see The Major section below).
- Filing this plan with your adviser *does not* preclude subsequent modifications of the plan or a change of major.
- Before you complete 135 units of degree credit,

including transfer work, you must obtain a Degree Check (see the end of this section) from the Letters and Science Advising Office and consult your adviser concerning course selection and satisfaction of requirements in the major.

Before you complete 195 units of degree credit, including transfer work, you must develop in consultation with your faculty 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 (see at the end of this section) in order to achieve your goals and to meet the degree requirements, you must contact the Letters and Science Advising Office immediately.

If you have not met with your faculty adviser before these established check points, a hold will be placed on your registration materials as a reminder.

**New students** are assigned to a faculty adviser when the University receives their Statement of Intent to Register. If you indicated an interest in a particular program on your application for admission, your adviser will be a faculty member associated with that major. If you change your major, you will be reassigned.

If your faculty adviser happens to be unavailable at a critical time, you should ask the department or program administering your major for an alternate adviser to assist you temporarily. Department and program offices are listed in the *Class Schedule and Room Directory*.

If you *did not* indicate an initial commitment to a particular major program on your application for admission, you will participate in the **Academic Options Program** which is designed to provide academic advising to lower division students. You will be advised by a team of advisers: several faculty members representing the four Letters and Science major areas, an academic counselor and a peer adviser. This advising team will be available in the Letters and Science Outreach Advising Offices located in each of the university residence hall complexes. Through one-on-one advising and group workshops and programs, this team will work with you to guide your academic planning to ensure progress toward your educational goals and satisfaction of your degree requirements. They will assist you in exploring your options before you select your major.

Students are assigned to the Academic Options Program advising team located in their university residence hall complex. Students living off campus are asked to contact the Letters and Science Advising Office, 150 Mrak Hall, early in the quarter to receive their adviser assignments.

New students are encouraged to see their faculty adviser at least once every quarter during their first year on campus to discuss their educational goals, course program, and progress.

If you participate in the Summer Advising and Registration Conference, you will be assisted in planning your Fall Quarter program by a temporarily assigned summer faculty adviser. During Orientation Week of



Letters and Science Advising Office, are prepared to answer most questions about College requirements. Student-to-student advising is an important part of the University advising services. **Preprofessional advising** is also available to Letters and Science students, even though the College does not offer special pre-professional programs. Students who plan to prepare for a professional school undertake a normal program leading to a bachelor's degree. Some courses required by a professional school are included in the requirements for the bachelor's degree, and additional courses you need may be taken as electives. You should become aware of the requirements for prospective professional schools early in your career in order to plan a suitable program. You may obtain further assistance from the Health Sciences, Pre-Law, and Pre-Business Advising Offices, or the Internship and Career Center.

## TEACHING CREDENTIAL

The teacher education program is administered by the Graduate Division. See The Graduate Division section, Teacher Credential Programs, for more complete information.

## THE MAJOR

There are three types of programs which satisfy requirements for the major: departmental majors, interdepartmental majors, and individual majors.

### Major Programs Offered by the College of Letters and Science

Following is a list of the departmental and interdepartmental major programs offered by the College of Letters and Science. All but five of the majors offer a Bachelor of Arts degree. Those which lead to a Bachelor of Science degree as well are indicated by a footnote symbol (see below). Each Letters and Science major comes under one of the three General Education categories: Culture and Civilization (CC), Contemporary Societies (CS), and Nature and the Environment (NE). The appropriate category is indicated immediately following the major.

- Afro-American Studies (CS)
- American Studies (CC)
- Anthropology<sup>1</sup> (A.B. degree—CS; B.S. degree—NE)
- Applied Physics<sup>2</sup> (NE)
- Art History (CC)
- Art Studio (CC)
- Biochemistry<sup>2</sup> (NE)
- Biological Sciences<sup>1</sup> (NE)
- Botany<sup>1</sup> (NE)
- Chemistry<sup>1</sup> (NE)
- Chicano (Mexican-American) Studies (emphasis Humanities—CC; emphasis Sociology—CS)
- Classical Civilization (CC)
- Comparative Literature (CC)
- Computer Science<sup>2</sup> (NE)
- Dramatic Art (CC)
- East Asian Studies (CC)
- Economics (CS)
- English (CC)
- French (CC)
- Genetics<sup>2</sup> (NE)
- Geography<sup>1</sup> (A.B. degree, emphases I, II, III, V—CS, emphasis IV—NE; B.S. degree—NE)

the fall quarter, you should contact the regular faculty adviser you have been assigned.

**Continuing students** who have completed three quarters in residence in the College are no longer obligated to consult an adviser except at checkpoint stages (above); they are urged, however, to maintain regular contact with an adviser in their major to avoid program errors which may delay graduation.

**Seniors** should maintain close contact with their adviser in order to ensure that they are meeting the major requirements.

### Peer Advising

Student-to-student advising is an important part of the University advising services. Peer advisers are integral members of the staff advising teams in the Letters and Science Advising Office, 150 Mrak Hall, and are always available to talk with students about their academic concerns. Refer to the index under "Advising" for information on the various peer advising programs throughout the campus.

### Letters and Science Advising Office

Information:  
150 Mrak Hall  
916-752-0392

Deans and academic counselors are available by appointment and other advising personnel are ready to answer questions on a drop-in basis at the Letters and Science Advising Office. Students who are as yet uncertain of their goals, and especially students lacking a clearly identifiable interest, are urged to make an appointment with one of the counselors. **Peer advisers**, as members of the staff advising teams in the

Geology<sup>1</sup> (NE)  
 German (CC)  
 Greek (CC)  
 History (CC)  
 International Relations (CS)  
 Italian (CC)  
 Latin (CC)  
 Linguistics (CC)  
 Mathematics<sup>1</sup> (NE)  
 Medieval Studies (CC)  
 Microbiology<sup>1</sup> (NE)  
 Music (CC)  
 Native American Studies  
 Philosophy (CC)  
 Physical Education<sup>1</sup> (NE)  
 Physics<sup>1</sup> (NE)  
 Physiology<sup>2</sup> (NE)  
 Political Science (CS)  
 Political Science—Public Service (CS)  
 Psychology<sup>1</sup> (NE)  
 Religious Studies (CC)  
 Rhetoric and Communication (CC)  
 Russian (CC)  
 Sociology (CS)  
 Sociology—Organizational Studies (CS)  
 Spanish (CC)  
 Statistics<sup>1</sup> (NE)  
 Women's Studies (CS)  
 Zoology<sup>1</sup> (NE)

<sup>1</sup>Offers a program leading to the Bachelor of Science degree as well as a program leading to the Bachelor of Arts degree.

<sup>2</sup>Offers the Bachelor of Science degree only.

Courses listed in this catalog under Asian American Studies, Astronomy, Chinese, Classics, Education, Integrated Studies, Japanese, Portuguese, Scandinavian, and Swedish are taught by teaching departments or programs in the College of Letters and Science, but *no undergraduate majors* in these areas now exist.

### Declaration of Major

After an initial period of academic exploration, students are expected to focus their interests and declare a major by the time they have completed 90 units. If you have not declared a major by this point, a hold will be placed on your registration materials. The hold will be removed only when your *Petition for Declaration or Change of Major* is on file in the Dean's Office. Petitions can be obtained from faculty advisers or the offices administering the respective major programs. Office locations are published in this catalog and the *Class Schedule and Room Directory* each quarter. As a part of the petitioning 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 Dean have approved the petition. The department or curriculum committee supervising the major program will assign you to a faculty adviser.

To be accepted into a major, you must have a C average in all courses you have completed that are a requirement for that major, as well as a C average in the upper division courses you have taken toward the major. 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.

### Individual Major

Students with academic interests not covered by an established major have the opportunity to develop an individual major. If you choose this option you will work closely with faculty advisers who have expertise in the requisite fields of interest to develop a coherent and rigorous academic program. This program of courses is then submitted to a faculty committee for review and approval. If you wish to undertake an individual major, request the appropriate forms, which include detailed instructions, from the Dean's Office, 150 Mrak Hall. Program requirements are outlined under Individual Major in the Programs and Courses section of this catalog.

### Multiple Majors

If you are interested in two or more areas of study, you may choose to satisfy the requirements of more than one major. Multiple majors offer the advantage of a systematic, in-depth approach to two or more disciplines. However, flexibility in planning your courses and exploring new areas of knowledge are restricted by the obligation to satisfy the requirements of more than one major. Students choosing to satisfy multiple major requirements notify the Dean's Office of their decision by submitting 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 towards 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 minimal number of units that must be unique.

2. At the time of request, a substantial part of the preparatory subject matter must have been successfully completed and at least two upper division courses in each major.

It should be possible to complete all degree requirements within the 225-unit limit.

Combination proposals that *cannot be approved* are two or more majors

1. *in the following group: Biochemistry, Biological Sciences, Botany, Genetics, Microbiology, Physiology, and Zoology;*
2. *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 Major

You may simultaneously pursue major programs in two undergraduate colleges on the Davis campus. The same conditions and criteria apply as for multiple majors. Cross-college programs will not be approved if the majors involved are available within a single college as well. For example, cross-college programs between the Colleges of Letters and Science and Agricultural and Environmental Sciences will not be approved if one of the majors is Biochemistry, Biological Sciences, Botany, Genetics, Microbiology, Physiology, or Zoology.

## Change of Major Within the College

You may change from one major to another within the College. Consent of the department or committee in charge of your proposed new major is required. Admission into a major program may be denied by the program or by the Dean if your grade-point average in courses required for the selected major is less than 2.000.

Procedures for change of major within the 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). It is not possible to change or declare a major in the quarter of graduation.

## Change of Major Accompanied by Change of College

In order to change from one college to another, you must be in good standing (not on probation or subject to disqualification).

If you are in good academic standing and want to transfer into the College of Letters and Science, you must petition to do so within the first five weeks of any quarter. Petitions, which are available at the Office of the Registrar and the Dean's Office, must be endorsed by your new faculty adviser and signed by your former College Dean before being submitted to the Letters and Science Dean for consideration and approval.

A 2.000 grade-point average in the courses required for the new major is usually necessary at the time of transfer. Requests for changes of major from students in senior standing may be approved only under unusual circumstances, but in no case during the quarter of graduation.

## Grade-Point Averages in the Major

In addition to the general University requirement of a C average (2.000) for all University work, the College stipulates the following additional grade-point criteria for graduation:

You must have an average of at least 2.000 for all UCD courses required for the major; you must also have at least a 2.000 average for all upper division courses required for the major.

A department or curriculum committee may refuse to accept you into a major they administer if you do not

have at least a 2.000 average in the courses required for the major.

If your performance is unsatisfactory after you have declared a major program, you may be required to withdraw from that major by the Dean, upon written recommendation from the chairperson of the department or the curriculum committee that administers the major.

## THE MINOR

If you are interested in two or more areas of study, you should consider the possibility of pursuing your goals by completing one or more of the optional minors offered by the College. Many teaching departments and programs offer optional minors and some also sponsor interdisciplinary minor programs. Completion of a minor is not required for graduation, but you may elect to satisfy requirements and have completion of the minor(s) certified on your transcript. Certification of a minor on the transcript indicates that you have completed a coherent program of courses in an area of interest outside your major. The minor may complement your major, but it is not particularly meaningful unless the field of study is significantly different from that of your major. Most teaching departments and programs that offer or sponsor a minor program list course requirements in the Programs and Courses section of this catalog. Following is a list of those minors:

Afro-American Studies  
American Studies  
Anthropology  
Art History  
Art Studio  
Asian American Studies  
Biological Sciences  
Botany  
Chicano (Mexican-American) Studies  
Chinese  
Comparative Literature  
Dramatic Art  
East Asian Studies  
Education  
English  
French  
Geography  
Geology  
German  
Greek  
History  
Italian  
Japanese  
Latin  
Linguistics  
Mathematics  
Medieval Studies  
Music  
Native American Studies  
Philosophy  
Physical Education  
Physics  
Political Science  
Portuguese  
Psychology  
Religious Studies



Rhetoric and Communication  
 Russian  
 Sociology  
 Spanish  
 Statistics  
 War-Peace Studies  
 Women's Studies

Some departments and programs in the college do not offer a minor, while others may offer several. You can elect only one minor in a subject area. If the department or program you are interested in does not list a minor in this catalog, check with that department or program office. Letters and Science students may elect minor programs approved by the College of Agricultural and Environmental Sciences.

A minor consists of 18 to 24 units in upper division courses specified by the department or program. **At least half of these units and courses must be completed in residence on the Davis campus.** You are also expected to complete all courses that are prerequisite to the upper division courses. In order to request certification of a minor, **you must have a grade-point average of 2.000 in all courses required for the minor.** At most, one course used in satisfaction of your major may be applied to your minor. If you elect more than one minor, these minors may not have any courses in common.

If you want to have completion of a minor certified on your transcript, you must obtain a Minor petition from the College Dean's Office and file it no later than the second week of the quarter in which you are graduating. Requirements for the minor must be met by the time of graduation. For specific deadlines, see the Academic Calendar at the front of this catalog.

## DEGREE REQUIREMENTS

Each student is responsible for fulfilling all requirements for graduation. The University and General

Education requirements can be found in the Bachelor's Degree Requirements section of this catalog. College requirements are listed below, including any restrictions in addition to the aforementioned requirements.

### Unit Requirements

A minimum of 180 units is required for the bachelor's degree (see Unit Credit Limitations below). Of these units, 64 must be upper division units which include 48 units from Letters and Science teaching departments and programs. For the A.B. degree, a minimum of 12 of 48 units of upper division Letters and Science courses must be from outside the major department or program. All upper division General Education courses will be accepted in satisfaction of this requirement. Nonstandard courses (see Area Requirement in this section) do not count toward these 12 units.

**Unit Credit Limitations.** For certain courses, limits have been established for 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:

*Professional courses (300 and 400 series, except numbers 399 and 499):* 9 units maximum.

*Extension courses:* 9 units maximum by petition.

*Graduate courses:* 9 units maximum by petition.

*Internship courses (numbers 92, 192):* 12 units maximum including internship units taken at other institutions. (See under Nonstandard courses below.)

*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 UCD, whichever is the smaller. (Note separate unit limits on internship,

special study, and tutoring courses; and major limitations.)

**Passed/Not Passed Courses:** Maximum of one-fourth of UCD units graded P taken at student's option. (See also the Academic Information section.)

**Physical Education 1:** 6 units maximum.

**Special Study courses (99, 194H, 199):** 5 units maximum in any one quarter. (See under Nonstandard courses above.)

**Tutoring courses (97T, 97TC, 197T, 197TC):** 10 units maximum. (See under Nonstandard courses above.)

**Limitation on Credit for Units Graded P. Excluding** courses which 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 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 Davis campus. This limitation applies to *all* Davis undergraduates, including Letters and Science students.

### **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 Davis campus. For University requirements, see the Bachelor's Degree Requirements section in this catalog. (Work completed while enrolled in the Education Abroad Program does not satisfy campus or College Residence requirements.)

### **Scholarship Requirement**

The minimum grade-point average is 2.000 for all courses counted toward the major and for all upper division courses used to satisfy major requirements. To obtain these minimal averages in the major, you may, *with approval from your adviser*, repeat courses that are graded D or F. If you have to repeat a course more than once, you need the Dean's approval. Only grades earned in courses taken at UCD will be included in the grade-point computations.

### **English Composition Requirement**

The English Composition requirement can be met in one of two ways:

1. by passing the English Composition Examination (see College Policies and Procedures) 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 in English composition from English 1, 3, 20, Comparative Literature 1, 2, or 3;

#### **AND**

- b. English 102 or 103 (which must be taken after 84 units have been completed).

### **Foreign Language Requirement**

**A.B. and B.A.S. degrees**—the 15-unit level or the equivalent in one language. (For detailed information, see Foreign Language Requirement in this section.)

**B.S. degree**—none.

### **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 and, in the case of the A.B. degree, provides students the opportunity to become acquainted with performance in the fine arts.

**A.B. degree**—satisfaction of the campus General Education requirements **plus** completion of one of the following options:

- a. a "Mini Minor" consisting of a minimum of three **approved** upper division courses in a single Letters and Science department or program other than the major;

#### **OR**

- b. a minimum of three **approved** lower or upper division courses in Art, Music, or Dramatic Art from outside the student's major;

#### **OR**

- c. a certified minor from any UC Davis college or program

The Letters and Science faculty believes that the completion of a certified minor is often the best way for a student to obtain structure and coherence in pursuit of intellectual breadth.

**For the purposes of options a and b above, all courses are considered as approved except:** courses bearing less than 3 units credit, internship courses, non-standard courses, directed group study courses, and courses used to satisfy the College English Composition Requirements.

Twelve units of *upper division* courses must be completed in Letters and Science teaching departments other than the major department or program. Courses numbered 92, 97T, 97TC, 98, 192, 197T, 197TC, 198, and from 200 through 499 cannot be counted toward satisfaction of the 12-unit requirement; not more than 10 units in special study courses (194H, 199) may be counted.

**B.S. degree**—a total of 90 units in natural sciences/mathematics; and satisfaction of the General Education requirement (see Bachelor's Degree Requirements section).

### **Major Program Requirements**

Requirements for major programs are described in the Programs and Courses section 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 6 units in internship courses (numbered 92, 192, or similar work-learn 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.

### Area Requirement List (B.S. degree)

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 requirements. A maximum of 10 units in special study courses (99, 194H, 199) may be counted toward that portion of the Area requirements. Courses used to satisfy the English Composition and Foreign Language requirements may not be counted toward the area requirement. Subject to the restrictions just listed, courses acceptable for fulfilling the 90-unit natural sciences/mathematics area requirement are as follows:

#### Natural Sciences and Mathematics

Anthropology 1, 5, 15, 151, 152, 153, 154A, 154B, 155, 156, 157, 158.  
 Astronomy.  
 Avian Sciences 13.  
 Biochemistry and Biophysics.  
 Biological Sciences. All courses except 19.  
 Botany.  
 Chemistry.  
 Engineering 20.  
 Engineering: Civil 30.  
 Engineering: Computer Science 10, 30, 32, 40, 100, 110, 120, 122, 140, 170.  
 Engineering: Electrical and Computer Science 171.  
 Entomology 10, 100.  
 Environmental Studies 30.  
 Food Science and Technology 2.  
 Genetics.  
 Geography 1, 3, 108, 110, 112, 115, 116, 117.  
 Geology.  
 Human Anatomy 101.  
 Integrated Studies 1A, 1B, 8A.  
 Mathematics.  
 Microbiology.  
 Nutrition 10.  
 Physical Education 101, 102, 103, 110, 111, 112, 113, 115.  
 Physics.  
 Physiology.  
 Psychology 15, 41, 103, 105, 108, 129, 130, 131, 134, 136, 150, 154, 180B.  
 Resource Sciences 2, 131.  
 Statistics.  
 Textiles and Clothing 110.  
 Wildlife and Fisheries Biology 10.  
 Zoology.

### Foreign Language Requirement (A.B. and B.A.S. degrees)

**Acceptable Languages.** The Foreign Language requirement may be satisfied in any language offered at UCD, or for which transfer credit is allowed from another academic institution.

You may also satisfy this requirement by examination in a language not offered on the Davis campus. In this

case, the Dean's Office will assist you in making arrangements to take an examination on another University of California campus, with a faculty member who teaches the language in question.

**Satisfaction of the Requirement.** The Foreign Language Requirement should be completed by the end of your first or second year, as program priorities permit. This is particularly important if you plan to apply for the University's Education Abroad Program (junior year abroad).

The Foreign Language requirement may be satisfied by examination or completion of language courses as follows:

1. *Foreign Language Placement Test.* This 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.

You may validate your knowledge of a language learned in high school by taking this test. A test may not be taken, however, in a language for which you have already received degree credit. If you are a transfer student, consult your *Status Card*, which is issued by the Dean's Office prior to admission to the College.

2. *College Board Achievement Test.* Earning a qualifying score of at least 550 on a College Board Foreign Language Achievement Test satisfies the requirement. This test may be taken at any time during your high school career. Once your score is on file at the Undergraduate Admissions Office notify the Letters and Science Dean's Office so that satisfaction of the College requirement can be noted on your record.

3. *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.

4. *Course Completion in College (or the equivalent).* A.B. degree—15-unit level in one language (e.g., Spanish 3 or Japanese 3). B.S degree—as required in the major program.

If you have successfully completed (C- or better) 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 on a P/NP grading basis only.

5. *Proficiency Examination.* If you have not completed the required level language course, but assume you have attained equivalent knowledge, you may satisfy the language requirement by passing a proficiency examination. For more information consult the appropriate foreign language department.

### Change in Requirements

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



**Extension Courses.** Students may apply credit earned in University Extension courses toward the 180-unit requirement, only when written approval has been obtained from the Dean *prior* to enrollment. The degree credit allowed by the Dean for Extension courses is usually less than the unit value listed in the course description. A maximum of 9 units may be offered for elective credit only. Such units and courses may not be applied toward fulfillment of the Area, Foreign Language, Upper Division, or Senior Residence requirements of the College. No grade points are assigned for courses completed in University Extension.

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#### **Graduate and Professional Courses.**

**Enrollment**—Undergraduates may enroll in graduate and professional courses in the 200, 300, and 400 series under the following conditions.

- Graduate courses in the 200 series are ordinarily open only to students who have completed at least 18 units of upper division work basic to the subject matter of the course.
- Admission to graduate and professional courses must be approved by the instructor in charge of the course.

Graduate and professional courses which 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.

**Degree Credit**—Within the limitations A, B, and C given below, an undergraduate student in the College may count up to 9 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 Dean.

A. The recommendations of the instructor in the course and the department chairperson—in addition to approval from the Dean—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 3.3 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

College requirements (see General Education requirement for an exception) as stated in any UCD *General Catalog* in effect at any time you were enrolled in a postsecondary institution of higher education (i.e., 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 these matters are handled, check with the department or major program office if you have any questions about which requirements are applicable to you.

## **COLLEGE POLICIES AND PROCEDURES**

Inquiries concerning the policies and procedures listed in this section should be directed to the Dean's Office, College of Letters and Science, 150 Mrak Hall.

### **CREDIT FOR COURSES**

**Advanced Placement Examinations.** For credit allowed and course equivalencies on units earned through Advanced Placement Examinations, see the College Board chart in the Academic Information section.

**Education Abroad Program.** Full University credit may be awarded for courses taken through the Education Abroad Program. See the Introduction section in this catalog for eligibility requirements and application deadlines.

- 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.

**Internship Courses.** Student internships (generally courses numbered 92 and 192) are available through many Letters and Science departments. You must have completed a minimum of 84 units before credit will be allowed for an upper division internship course. Internships offer students the opportunity to apply classroom learning, to experience various work situations, and to test their career objectives. The Internship and Career Center has information on internships available or can help you develop one.

**Repeated Courses.** You may repeat a course in which you received a D, F, or NP. If the course you would like to repeat is part of a sequence (e.g., Mathematics 16A, 16B, 16C) and you have already passed a subsequent course in the sequence (e.g., you want to repeat Mathematics 16A, but you have already passed Mathematics 16C), you should check with the Dean's Office and the department regarding whether you can receive grade-point and/or unit credit. (See also the section on Academic Information.) See also, the section on Repetition of Courses in the Academic Information section of this catalog, especially regarding computing the grade-point average for the first 16 units of repeated courses and thereafter.

**Transfer Courses in English Composition.** Transfer courses considered by the Dean to be equivalent or comparable to English 1, 3, 20, 103A-G, or Comparative Literature 1, 2, 3 will be accepted toward satisfaction of the English Composition requirement. Note that English 103 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 English 102 or 103 at Davis.

#### ENGLISH COMPOSITION EXAMINATION

The English Composition requirement can be met with a passing score in the English Composition Examination. No fee is charged and no unit credit is given for the examination.

This academic year, the no-fee examination will be offered on the following Saturday mornings:

October 27, 1990  
February 2, 1991  
April 27, 1991

If you take this examination, you must do so after having completed 70 units. There are no examinations administered during the summer.

Sign-up rosters will be posted on the College of Letters and Science's bulletin board, Mrak Hall foyer, Monday through Thursday (or until filled) just preceding each Saturday examination date.

The English Composition Examination form, available at the UCD Bookstore, is required.

#### PASSED/NOT PASSED GRADING

##### Filing Procedures

Passed/Not Passed petitions are available for students in good academic standing in the Dean's Office, 150 Mrak Hall, on the dates listed in the *Class Schedule and Room Directory*, and must be filed in person.

No signature other than yours is required on the petition. For detailed information, see the Academic Information section in this catalog.

Graduating seniors, and other students planning to undertake graduate or professional studies, should consult an adviser before petitioning for Passed/Not Passed in courses required for the major program.

#### REGISTRATION BEYOND THE 225-UNIT LIMIT

A minimum of 180 units is required for the bachelor's degree, and you are normally expected to fulfill all degree requirements within the 180- to 225-unit range. Once 225 units have been completed, you may register only with the permission of the Dean. Permission may be granted for sound educational reasons and for a limited time. 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 before course enrollment materials can be made available to you 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.

#### DEGREE CHECK

Before the beginning of your senior year, you should take some time to consider your goals and to plan the academic program for your final year as an undergraduate. To plan properly and insure 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, an informational packet is available in the Letters and Science Advising Office providing detailed instructions on evaluating your progress on College and University requirements along with special workshops for seniors. You should also obtain a check of major requirements from your faculty adviser.

Once you have completed 135 units of degree credit, a hold will be placed on your registration materials requiring that you contact the Letters and Science Advising Office and your faculty adviser for a degree check.

#### UNIT LIMITATIONS

Ordinarily, a full-time student takes 12 to 15 units a quarter. (Note the Minimum Progress requirements in the Academic Information section.) In order to graduate in four years you need to complete 15 units a quarter.

Students in their freshman 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 study list may not exceed 21 units each quarter.

These unit limitations include non-credit remedial courses and repeated courses, but make-up work to remove incomplete grades is not included.

## HONORS

### The Dean's Honors List

The Dean's Honors List recognizes the academic achievements of students who have

1. completed at least 12 units for a letter grade during that quarter;
2. earned a grade-point average, for that quarter, that places them in the upper 16 percent of the students registered in their class level.

To remain on the Honors List you must meet these same standards every quarter. This list is posted quarterly on the College bulletin board in the foyer of Mrak Hall.



### The Honors Program of the College of Letters and Science

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The honors program in the College of Letters and Science is designed to permit 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.

Entrance into the honors program requires that a student have completed at least 135 units with a minimum grade-point average of 3.5 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. Successful completion of the honors program requires that a minimum of six units' credit be earned in course work for the project.

### Honors with the Bachelor's Degree

Three categories of honors are awarded at graduation, honors, high honors, and highest honors. Graduation with honors requires that a student meet the appropriate grade-point requirement for all courses as described in the Academic Information section in this catalog. Students who complete the Honors Program and who meet the grade-point requirement for graduation with honors 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.

You will not be awarded honors with the bachelor's degree if more than eight units of grade I (Incomplete) appear on your transcript. The College Committee on Honors may consider exceptions to this condition. Petitions for this purpose should be submitted to the Dean's Office.

### University and College Medals

Graduating seniors with a distinguished academic record in the College of Letters and Science 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 from a disciplinary area other than that of the College medalist. Academic excellence is the primary basis for selecting the recipients of these awards.

The Lawrence J. Andrews prize is awarded to a senior who not only has achieved academic excellence, but who also has interests outside of pure scholarship.

The college also nominates graduates with distinguished academic records for the University Medal.

# The Graduate Division

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The Graduate Division is the academic home of approximately 3,300 post-baccalaureate students who are seeking advanced degrees in more than 80 graduate programs on the Davis campus.

Graduate study and research are administered by the Graduate Council, a standing committee of the Davis Division of the Academic Senate, and by the Dean of the Graduate Division. A Universitywide Coordinating Committee on Graduate Affairs determines general policies and establishes common procedures.

Davis graduate programs are administered either by departments or graduate groups. Graduate groups are composed of individual faculty members with similar disciplinary or research interests. The group structure, used extensively at Davis, permits faculty to be affiliated with graduate programs in more than one discipline and offers students flexibility and breadth by crossing the administrative boundaries of the various departments, colleges, schools and sometimes campuses. Conforming well to UCD's progressive spirit, the group structure also allows for expansion of established degree programs and facilitates development of new ones. Almost half of the graduate programs at Davis are sponsored by graduate groups.

## **ADVANCED DEGREE AND CERTIFICATE PROGRAMS AT DAVIS**

The following advanced degrees are offered at UC Davis: Master of Business Administration, Master of

Arts, Master of Science, Master of Fine Arts, Master of Arts in Teaching, Master of Engineering, Master of Education, Master of Agricultural Management, Master of Preventive Veterinary Medicine, Candidate in Philosophy, Doctor of Engineering, and Doctor of Philosophy. Those departments or groups offering programs for the degree of Doctor of Philosophy may, if they choose to do so, recommend the degree Candidate in Philosophy for all students formally advanced to candidacy. In addition to these graduate degrees, professional degrees are offered in the Schools of Law, Management, Medicine, and Veterinary Medicine.

Majors for graduate study and the advanced degrees offered in each are shown below. General requirements for degrees are published in the *Graduate Announcement*. Specific requirements are available from the office or chairperson of the graduate program or group concerned.

### **Majors and Degrees**

Agricultural and Environmental Chemistry (M.S., Ph.D.)  
Agricultural Economics (M.S., Ph.D.)  
Agricultural Education (credential)  
Agronomy (M.S.)  
Animal Behavior (Ph.D.)  
Animal Science (M.S., M.A.M.)  
Anthropology (M.A., Ph.D.)  
Applied Mathematics (M.S., Ph.D.)  
Art (M.F.A.)  
Atmospheric Science (M.S., Ph.D.)  
Avian Sciences (M.S.)

## **DEADLINES**

	<b>FALL 1990</b>	<b>WINTER 1991</b>	<b>SPRING 1991</b>	<b>FALL 1991</b>
Deadline for filing applications for admission to graduate standing, with complete credentials, with the Dean of the Graduate Division				
United States residents	June 1			June 1
International students	April 1			April 1
Deadline for filing applications for readmission to graduate status with the Graduate Division	Aug. 1	Nov. 1	Feb. 1	Aug. 1
Deadline for students who expect to complete work for master's degrees to file applications for candidacy with the Dean of the Graduate Division	Oct. 1	Jan. 11	Mar. 1	June 3 (for Sept. '91) Oct. 1 (for Dec. '91)
Deadline for candidates for master's degrees to file theses with the committee in charge	Nov. 1	Feb. 8	May 6	July 22 (for Sept. '91)
Deadline for candidates for master's degrees to file theses or final report on comprehensive examination with the Dean of the Graduate Division	Dec. 14	Mar. 22	June 14	Sept. 13 (for Sept. '91)
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 the Graduate Division	Aug. 13	Nov. 12	Feb. 1	May 20 (for Sept. '91) Aug. 15 (for Dec. '91)
Deadline for candidates for the degrees of Doctor of Philosophy and Doctor of Engineering to file theses with the committee in charge	Oct. 1	Jan. 7	Apr. 1	July 1 (for Sept. '91)
Deadline for candidates for the degrees of Doctor of Philosophy and Doctor of Engineering to file theses with the Dean of the Graduate Division	Dec. 3	Mar. 1	June 3	Sept. 2 (for Sept. '91)

Biochemistry (M.S., Ph.D.)  
 Biomedical Engineering (M.S., Ph.D.)  
 Biophysics (M.S., Ph.D.)  
 Business Administration (M.B.A.)—refer to Graduate School of Management  
 Cell and Developmental Biology (Ph.D.)  
 Chemistry (M.S., Ph.D.)  
 Child Development (M.S.)  
 Classics (M.A.)  
 Community Development (M.S.)  
 Comparative Literature (M.A., Ph.D.)  
 Comparative Pathology (M.S., Ph.D.)  
 Computational Science (Ph.D.)  
 Computer Science (M.S., Ph.D.)  
 Dramatic Art (M.A., M.F.A., Ph.D.)  
 Earth Sciences and Resources (M.S., Ph.D.)  
 Ecology (M.S., Ph.D.)  
 Economics (M.A., Ph.D.)  
 Education (M.A., credential)  
 Endocrinology (M.S., Ph.D.)  
 Engineering (M. Engr., M.S., D. Engr., Ph.D.)  
 English (M.A., Ph.D.)  
 Entomology (M.S., Ph.D.)  
 Exercise Science (M.S.)  
 Food Science (M.S., Ph.D.)  
 French (M.A., Ph.D.)  
 Genetics (M.S., Ph.D.)  
 Geography (M.A., Ph.D.)  
 Geology (M.S., Ph.D.)  
 German (M.A., Ph.D.)  
 History (M.A., M.A.T., Ph.D.)  
 History of Art (M.A.)  
 Horticulture (M.S.)  
 Human Development (Ph.D.)  
 Immunology (M.S., Ph.D.)  
 International Agricultural Development (M.S.)  
 Law (J.D.)—refer to School of Law  
 Linguistics (M.A.)  
 Master of Education (M.Ed.)  
 Mathematics (M.A., M.A.T., Ph.D.)  
 Medicine (M.D.)—refer to School of Medicine  
 Microbiology (M.S., Ph.D.)  
 Music (M.A., M.A.T., Ph.D.)  
 Neurobiology (Ph.D.)  
 Nutrition (M.S., Ph.D.)  
 Pharmacology and Toxicology (M.S., Ph.D.)  
 Philosophy (M.A., Ph.D.)  
 Physical Education (M.A.)  
 Physics (M.S., Ph.D.)  
 Physiology (M.S., Ph.D.)  
 Plant Biology (M.S., Ph.D.)  
 Plant Pathology (M.S., Ph.D.)  
 Plant Protection and Pest Management (M.S.)  
 Political Science (M.A., Ph.D.)  
 Preventive Veterinary Medicine (M.P.V.M.)—refer to School of Veterinary Medicine  
 Psychology (M.A., Ph.D.)  
 Rhetoric and Communication (M.A.)  
 Russian (M.A.)  
 Sociology (M.A., Ph.D.)  
 Soil Science (M.S., Ph.D.)  
 Spanish (M.A., Ph.D.)  
 Statistics (M.S., Ph.D.)  
 Textiles (M.S.)  
 Vegetable Crops (M.S.)  
 Veterinary Medicine (D.V.M.)—refer to School of Veterinary Medicine

Water Science (M.S.)  
 Zoology (M.A., Ph.D.)

### Graduate Group Programs

Programs sponsored by graduate groups with faculty drawn from more than one department are listed below. If you are interested in one of these areas of study, write to the group chairperson for more information. These programs are also entered alphabetically in the Programs and Courses section of this catalog, along with mailing addresses.

Agricultural and Environmental Chemistry  
 Agricultural Education  
 Animal Behavior  
 Applied Mathematics  
 Atmospheric Science  
 Avian Sciences  
 Biochemistry  
 Biomedical Engineering  
 Biophysics  
 Botany  
 Cell and Developmental Biology  
 Child Development  
 Community Development  
 Comparative Literature  
 Comparative Pathology  
 Computer Science  
 Earth Sciences and Resources  
 Ecology  
 Endocrinology  
 Engineering  
 Exercise Science  
 Food Science  
 Genetics  
 Horticulture  
 Human Development  
 Immunology  
 International Agricultural Development  
 Linguistics  
 Master of Education  
 Microbiology  
 Neurobiology  
 Nutrition  
 Pharmacology and Toxicology  
 Physiology  
 Plant Physiology  
 Plant Protection and Pest Management  
 Preventive Veterinary Medicine  
 Soil Science  
 Statistics  
 Textiles  
 Water Science

### APPLYING FOR ADMISSION

The University of California, Davis is committed to maintaining excellence, preserving fairness, and promoting diversity in its student population. Admissions criteria assess applicants' probable future academic achievements and their potential for service in the field, keeping in mind the needs of our society and of minority and disadvantaged communities. Criteria also attempt to take into account any prior disadvantages applicants have experienced that may bear on future achievements and services.

Admission to a graduate program at the University of California requires a bachelor's degree that is comparable to a degree from the University of California both in distribution of academic subject matter and in scholarship achievement.

The primary requirement for admission to any program is evidence of intellectual achievement and promise. Your application will be evaluated primarily on the basis of your transcript to assure that your qualifications meet minimum standards as set by Universitywide and UC Davis Graduate Councils. Generally, you must have a minimum B average in undergraduate course work from an institution of acceptable standing to be considered for admission. Graduate programs frequently require submission of additional materials such as a separate application form, Graduate Record Examination (GRE) scores, letters of recommendation, portfolios, or examples of written work to assist them in selecting from among qualified applicants. Admission to graduate study is limited by the number of spaces available in major programs. Not all eligible applicants can be admitted.

Applications are accepted for fall quarter only. 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 employment as a teaching or research assistant or of receiving financial support are greatly enhanced by applying early. The application deadline is June 1, unless otherwise indicated by the program, or until your proposed major program is full, whichever occurs first.

Contact the Graduate Division for the Combined Application for Admission and Fellowship Form.

The completed application form, along with the \$40 nonrefundable application fee and official transcripts from each college and university you have attended must be sent directly to the Graduate Division. Supplemental application materials required by the major program must be sent directly to the graduate adviser for that program. When all application materials have been received by the Graduate Division, they will be forwarded to your proposed major program where they will be evaluated along with the supplemental materials you have sent to the program adviser. The Graduate Admissions Advisory Committee for the program will submit its recommendation and evaluation to the Graduate Division; final admission decisions rest with the Dean of the Graduate Division. 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, and Master of Preventive Veterinary Medicine must be filed directly with the appropriate professional school.

### Readmission

If you were formerly enrolled in a regular session as a graduate student and wish to return, you must apply for reentry and pay the Readmission Application Fee of \$40 at least six weeks before the beginning of the quarter in which you plan to enroll (see the Academic Calendar at the front of this catalog). The application



is obtained from the Graduate Division Office. Transcripts of all work undertaken since you were last registered in graduate status at 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

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 a year in advance. Official copies or certified copies of all transcripts in English and in the original language are required before your application can be processed. Completed applications along with the nonrefundable \$40 application fee must be received from international students by April 1, unless your proposed program has an earlier deadline.

**English Requirement.** If English is not your native language and you have not studied at an institution where English was the language of instruction, you will be required to demonstrate proficiency in English by submitting your test scores from the Test of English as a Foreign Language (TOEFL). This test is given six times each year by the Educational Testing Service, CN6151, Princeton, NJ 08541-6151. The minimum score required for admission to graduate study at UC Davis is 550.

**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 (see under International Student Services in Student Life section for complete details). Prior to registration, you will be required to sign either the Statement of Responsibilities for a Privately Funded Student or the Statement of Responsibilities for a Sponsored Student to show that you are able to undertake this level of expense for your education at UC Davis. No financial aid of any kind (grants, loans, fellowships, scholarships, or work-study awards) is available to international students during their first year of enrollment at UC Davis.

## GENERAL REQUIREMENTS FOR ADVANCED DEGREES

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 the 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 in residence for at least three 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 Davis campus. With the consent of the graduate adviser and the Dean of the Graduate Division, however, some work taken elsewhere may be credited toward your degree. The normal limit for such transfer credit is 6 units from another institution or up to one-half of the unit requirement if the courses were taken at another campus of the University—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.

### Ph.D. 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 of the chosen field of study.

Students working toward a doctorate must be registered and in University residence for a minimum of six regular 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 which must be completed prior to your admission to the Qualifying Examination.

The Qualifying Examination is administered by a committee appointed by the Dean of the Graduate Division. The Examination is intended to demonstrate your 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, you may repeat the Examination one time.

After successful completion of the Qualifying Examination, you are advanced to Candidacy for the degree. At this time, a committee is appointed to direct you in your research problem and guide you in the preparation of the dissertation.

## 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 published in the *Graduate Announcement*. 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 Davis who plan to pursue graduate study should consult with their major adviser early in their senior year to guarantee adequate preparation.

## INTERCAMPUS EXCHANGE PROGRAM

As a graduate student registered on any campus of the University, you may become an Intercampus Exchange Student with the approval of your graduate adviser, the chairperson of the department or group in which you wish to study on the host campus, and the Dean of the Graduate Division on both the home and the host campuses.

Although as an Intercampus Exchange Student you have library, health service, and other student privileges on the host campus, you are considered a graduate student in residence on your home campus. The grades obtained in courses on the host campus are transferred to your home campus and entered on your official record.

Application forms may be obtained at the Office of the Dean of the Graduate Division and should be submitted six weeks prior to the beginning of the quarter in which you wish to participate in the program.

## PART-TIME ENROLLMENT

Some advanced degree programs are available to qualified graduate students who for reasons of occupation, family responsibility, or health are unable to attend full time. Students with part-time status must meet the same standards of quality for admission and for continuation in a graduate program as other students. Applicants desiring part-time enrollment in an approved program should file a petition with the Graduate Division after admission has been granted. Continuing graduate students who wish to change status between full-time and part-time must file a petition with the Graduate Division. To be considered eligible, graduate students must be enrolled for six units or fewer per quarter. Fee reductions that apply to part-time students are found under Fees and Expenses in

this catalog. Application forms are obtained at the Graduate Division Office. See the Academic Calendar for filing deadlines.

## EMPLOYEE-STUDENT STATUS

Reduced fees are available to UC career employees and certain UC retirees who are qualified for admission to the University. Once admission has been granted, a petition for the reduction in fees must be filed prior to each quarter of enrollment. Employee students pay one-third of the regular fees and may enroll for up to nine units or three courses per quarter whichever is greater. Employee students on the semester system may enroll for up to six units or two courses, whichever is greater. Detailed information is in the UC Staff Personnel Policy Manual (Sections 260.23 for employees, 775.7 for retirees, and 141.11 for the Administrative and Professional Staff Program) available in department offices, at the Library Reference Center, or the Staff Development and Professional Services office. Petitions can be obtained through the employee's unit.

## FELLOWSHIPS, ASSISTANTSHIPS, AND LOANS

Fellowships are awarded by the Fellowship Committee of the Graduate Council on the basis of scholarship and promise of outstanding academic and professional contribution. Applicants who plan to enter in a fall quarter and wish to be considered for a fellowship or graduate scholarship must file the combined Application for Admission and Fellowship no later than January 15 preceding the fall quarter to be attended. These applications are considered only once a year. If you are continuing in graduate status at Davis you must file an application for fellowship and graduate scholarship for continuing students with the chairperson of your graduate program on or before January 15. Applications for both new and continuing students may be obtained from the Graduate Admission/Fellowship Office, 252 Mrak Hall. International students are not eligible for fellowship consideration until they have completed one year as a graduate student at UC Davis. Information regarding graduate fellowships, which are supported by various federal and outside agencies, is available at the Graduate Division.

A limited number of Nonresident Tuition Fellowships are awarded each year to new nonresident U.S. citizens, permanent residents of the U.S., and continuing international students based on academic merit. The available fellowships are allocated to graduate programs which choose individual recipients from among their graduate students. These fellowships are for the full amount of the nonresident tuition. A minimum grade-point average of 3.25 is required for eligibility. Application forms for Nonresident Tuition Fellowships are available at the Graduate Division, and must be filed with that office by January 15 (new students) April 1 (continuing students). International students are not eligible for a fellowship unless they have completed at least 18 units of graded course work at UC Davis. Students receiving any funding from a government or other outside agency, whether or not the fees are paid directly to the University of California, are not eligible for a fellowship.

Teaching assistantships and research assistantships are available in many departments. Interested students should inquire at the office of the program in which they wish to work.

The Financial Aid Office has information about loans and work-study for graduate students.

## TEACHER CREDENTIAL PROGRAM

The teacher education program at UC Davis is administered by the Graduate Division.

Acceptance into the *multiple-subject (elementary) teaching credential program*, with either a regular or a bilingual emphasis (Spanish), does not require any specific campus major. If you are accepted to this program, you can meet the state requirements for a diversified major by completing a regular University major and one of the two following alternatives:

- the additional requirements for the approved UC Davis Diversified Waiver Program (must be completed by August 31, 1994); OR
- achieving a passing score on the National Teachers Examination (General Knowledge section only).

California state single-subject (secondary) teaching areas for which Davis students can qualify are: agriculture, English (including drama and speech), foreign languages, government, history, home economics, life science, mathematics, music, physical education, physical science, and social science. For information concerning University majors and campus waiver programs which satisfy requirements for these state single subjects, or state-approved examinations available to test competence in subject areas, consult the appropriate adviser in the Division of Education or the Department of Applied Behavioral Sciences.

While admission to the teacher education program is by the Graduate Division, applications and filing deadlines should be obtained from the Division of Education, 174 Kerr Hall, or the Department of Applied Behavioral Sciences (home economics and agricultural education), 106 AOB 4. A scholarship record of B (3.0) is required for admission to the program.

- The California Basic Educational Skills Test (CBEST) must be taken prior to acceptance by the Graduate Division.

The teacher education program is available to upper division students also. With careful planning, it is possible for students to finish the requirements for a non-renewable preliminary credential at the same time the bachelor's degree is completed. This credential allows recipients to teach for five years, but within that time an additional ("fifth") year of study must be completed for the professional clear credential. Specific requirements may be obtained from the Division of Education.

Students considering teaching as a career should consult the Division of Education or the Department of Applied Behavioral Sciences **as early as their freshman year**. Because of the complexity of the Teacher Preparation and Licensing Law and the requirements of Davis campus programs, students are encouraged to maintain close contact with education advisers throughout their undergraduate years.

# Professional School Preparation

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## REQUIREMENTS AND PREPARATION

Eligibility for admission to one of the University of California professional schools or curricula is contingent upon the successful completion of an undergraduate program of preprofessional training of 2 to 4 years, depending upon requirements for specific schools. Announcements and information describing admission and course requirements for a particular school are available by writing to the school of your choice in care of the appropriate University campus.

Legend and addresses:

- (B) University of California, Berkeley 94720
- (D) University of California, Davis 95616
- (I) University of California, Irvine 92717
- (LA) University of California, Los Angeles 90024
- (R) University of California, Riverside 92502
- (SD) University of California, San Diego, La Jolla 92093
- (SF) University of California, San Francisco 94143
- (SB) University of California, Santa Barbara 93106
- (SC) University of California, Santa Cruz 95064

Direct inquiries about schools and curricula in San Francisco (except Hastings College of the Law) in care of: Office of Student Admission.

### Professional schools and curricula requiring 2 to 3 years of undergraduate preparation:

- School of Business Administration (B)
- School of Criminology (B)
- Curriculum in Cytotechnology (SF)
- Curriculum in Dental Hygiene (SF)
- Schools of Dentistry (LA, SF)
- Curricula in Education (B, D, I, LA, R, SB, SC)
- School of Engineering (I)
- School of Engineering and Applied Science (LA)
- School of Forestry and Conservation (B)
- School of Journalism (B)
- Curriculum in Medical Illustration (SF)
- Curriculum in Medical Technology (SF)
- Schools of Medicine (D, I, LA, SD, SF)
- Schools of Nursing (LA, SF)
- School of Optometry (B)
- School of Pharmacy (SF)
- Curriculum in Physical Therapy (SF)
- Schools of Public Health (LA, B)
- School of Veterinary Medicine (D)

### Professional schools requiring a bachelor's degree in appropriate field of study for admission:

- School of Architecture and Urban Planning (LA)
- Graduate School of Business Administration (B)
- Schools (or Departments) of Education (B, D, I, LA, R, SB, SC)

Preparation for teaching credentials is available as follows:

- Elementary Teaching (B, D, I, LA, R, SB, SC, SD)
- Bilingual (Spanish) Emphasis—Elementary (D, I, LA, R, SB, SC, SD)
- Secondary Teaching (B, D, I, LA, R, SB, SC)
- Bilingual (Spanish) Emphasis—Secondary (I)
- Special Education (B, I, LA, R, SB)

- Pupil Personnel Services: Basic (Counseling) (B, I, LA, R, SB)
- Agricultural Specialist Teaching (D)
- Bilingual (Spanish) Specialist (D, SB)
- Reading Specialist (B, LA, R, SB)
- School Librarianship (B, LA)
- School Psychology (B, D, LA, SB)
- Clinical-Rehabilitative Services (SB)
- Administrative (B, I, LA, R, SB)
- Early Childhood Specialist (I)
- Administration (B, LA)
- Graduate School of Journalism (B)
- Graduate School of Management (D, I, LA, R)
- Schools of Law (B, D, LA)
- Hastings College of the Law (SF)
- School of Librarianship (B)
- School of Library and Information Science (LA)
- Graduate School of Public Policy (B)
- Schools of Public Health (LA, B)
- Schools of Social Welfare (B, LA)
- Scripps Institution of Oceanography (SD)

## PREPROFESSIONAL TRAINING

Preprofessional programs do not—in and of themselves—lead to a bachelor's degree. Since professional schools cannot accommodate all qualified applicants, students should prepare themselves for alternate careers and are expected to pursue a major program while completing their preprofessional requirements.

With careful planning it is possible for students to undertake any one of a variety of majors. While most students interested in the health sciences will elect a major within the biological sciences, majors as varied as psychology, engineering, and art can be equally acceptable. Law and business schools do not prescribe any specific major program. They give equal consideration to all qualified applicants completing a course of study which gives them a broad cultural background and includes intensive work for a substantial period of time in a selected field of study.

## REFERRAL INFORMATION

Although the Davis campus offers course work in preparation for admission to most of the schools listed above, the referral information which follows relates to the types of preprofessional training in greatest demand at Davis.

Students are strongly urged to read this catalog and the appropriate professional school announcement carefully before consulting faculty and staff about admission requirements. Communicate directly with personnel at the professional school to which you expect to apply if you need more detailed information. A list of general reference books which may be of interest is presented at the conclusion of this section.

## MANAGEMENT

The UC Davis **Graduate School of Management**, which enrolls its tenth class in the fall of 1990, offers a two-year program of study in management and policy analysis leading to the Master of Business Administration degree. (See the School of Management section for details.)

## BUSINESS ADMINISTRATION AND PUBLIC POLICY

**Preparation for study:** See published announcements of schools of business administration and public policy. For advice and counsel, see the departmental advisers in the Department of Economics (379 Kerr Hall, 916-752-0742) or Agricultural Economics (125 TB 8, 916-752-6185); or see the Pre-Business School (Peer) Adviser located in 359 Kerr Hall, 916-752-6512.

### TEACHING CREDENTIALS

**Preparation for Study:** Those interested in preparing to be a teacher should know that the majority of students complete a teaching credential as part of a graduate program. However, there is significant work that may be done as an undergraduate, including prerequisites or other courses related to schools and children. This not only better prepares students for the credential year, it relieves the stress of an already-crowded graduate professional year.

**Advising:** It is highly recommended that students consult the appropriate advising office as early as possible, particularly in specialized credentials such as bilingual education. All credential advising except Agriculture is done in the Student Advising Office of the Division of Education, 174 Kerr Hall (916-752-0757). Students interested in teaching Agriculture should go to the Department of Applied Behavioral Sciences in AOB 4 (916-752-1808).

**Application:** Students normally apply for the graduate credential program early in their senior year. See the Teacher Credential Program in the Graduate Division section of this catalog for additional information about acceptance into a credential program.

**Financial Assistance:** Financial support is available through such programs as APLE. Students from underrepresented groups are especially urged to apply.

### FORESTRY

**Preparation for Study:** Consult this catalog and the announcement of the Department of Forestry and Resource Management, UC Berkeley.

**Preforestry adviser:** John W. Menke (Agronomy and Range Science), 249 Hunt Hall, 916-752-0568 or 752-1703.

### LAW

**Preparation for study:** Consult this catalog, school announcements, and *The Official Guide to U.S. Law Schools*, prepared and published by the Law School Admission Council/Law Services.

**Advising:** Students interested in law school preparation should consult the Pre-Law Adviser, Pre-Law Advising Office, 108 South Hall, 916-752-3009. Information is available about law school admission procedures, academic program planning (see also under Advising Services), and professional possibilities.

**School of Law, UC Davis:** Consult this catalog, the catalog of the School of Law, or the Law School Admissions Office, 115 King Hall, 916-752-6477.

## HEALTH SCIENCES

**At the Davis campus only preparatory work is offered.** Professional training for all fields except medicine, nurse practitioner, physician assistant, and veterinary medicine must be completed elsewhere. Degree work is offered at Davis for dietetics, but students must apply elsewhere for the required post-graduate internship. Information regarding careers in dietetics or nutrition can be obtained from the Nutrition Department or the Internship and Career Center on campus. Contact the Health Sciences Advising Office, (South Hall, 916-752-2672) regarding curricula and schools for all health science fields.

**Suggested Curricula.** Since specific school requirements vary, students should either contact the schools directly, or contact the Health Sciences Advising Office for more detailed information.

Students are advised that in California most professional programs are unable to accommodate all applicants. Students may wish to consider applying also to out-of-state programs. Professional school admissions committees evaluate applicants on the basis of their course work and grades, test scores, work experience, campus or community activities, and letters of recommendation.

Courses listed under each of the following health fields of study are *general requirements only*.

### Clinical Laboratory Technology

To qualify for the required twelve-month medical technology traineeship in California, students need to complete a baccalaureate degree, which includes the following minimum course work requirements as specified by the State Department of Health.

Biological sciences: 27 units, including instruction in hematology (Clinical Pathology 101), immunology (Veterinary Microbiology 126 or Medical Microbiology 107), and medical microbiology (Veterinary Microbiology 127).

Chemistry: 24 units, including Chemistry 1A, 1B, 1C, 5 and Biochemistry 101A-101B or Physiological Sciences 101A-101B.

Physics 5A, 5B, 5C.

Mathematics: none required for California state license. Calculus (Mathematics 16A-16B) and statistics (Statistics 13) recommended.

Strongly recommended courses include: hematology (Clinical Pathology 101L); immunology (Veterinary Microbiology 126L); parasitology (Veterinary Microbiology 132, Medical Microbiology 215, or Entomology 156-156L); and a laboratory in clinical chemistry (e.g., Clinical Pathology 102 or Biochemistry 101L).

Recommended courses include: organic chemistry (Chemistry 8A-8B); Physiology 110-110L; virology (Veterinary Microbiology 128 or Microbiology 162); histology (Zoology 122).

Suggested electives:

Genetics (Genetics 100); Human Anatomy 101; advanced immunology (Veterinary Microbiology 270); computer programming (Engineering 5,



Computer Science Engineering 10, or 30); business management (Agricultural Economics 112).

Requirements vary among training programs. Students should check the individual program for additional required courses.

### Dentistry

Students complete three to four years of preprofessional course work prior to admission to the three- or four-year dental curriculum. The Dental Admission Test should be taken in April or October—one year prior to the projected date of admission, but preferably in April. Check individual catalogs for exact prerequisites.

Biological sciences (at least one year with laboratory).

Recommended: Biological Sciences 1A, 1B; Physiology 110-110L; Zoology 100-100L; Biochemistry 101A-101B; Microbiology 2-3.

Chemistry 1A-1B-1C, and at least 8 units of organic chemistry with laboratory (e.g., either courses 8A-8B, 128A-129A, or courses 128A-128B-128C and 129A-129B-129C). Check individual catalogs for specific requirements.

English: one year, preferably to include two composition courses (e.g., English 1, 3, 103). Comparative Literature courses are also acceptable.

Rhetoric courses are not acceptable.

Physics 5A, 5B, 5C.

Psychology: one lower- and one upper-division course. Recommended: Psychology 1, 16, 112, 145, or 168.

Suggested electives: Statistics 13 or Human Anatomy 101, 101L; Mathematics 16A-16B-16C; Genetics 100; sculpture course, art practice.

### Health Care Administration

A public administration or business management orientation is recommended for the baccalaureate and master's degree work. Schools of public health and graduate school programs in administration offer professional training. Entrance requirements *vary greatly* from program to program. The Graduate Record Exam (GRE) or Graduate Management Aptitude Test (GMAT) is required for admission to most schools. Contact the school of your choice for particular requirements. Elective courses may be selected from the following subject areas:

Agricultural Economics  
Applied Behavioral Sciences  
Biological Sciences  
Community Health  
Economics  
Engineering  
English  
Epidemiology and Preventive Medicine  
Food Service Management  
History  
Mathematics  
Statistics or Agricultural Science and Management,  
Computer Science Engineering  
Political Science  
Psychology  
Rhetoric  
Sociology

### Medicine

Most students complete four years of preprofessional course work prior to admission to medical school. Any major is appropriate for admission. The Medical College Admission Test must be taken at least one year prior to expected date of admission. Check individual medical college catalogs or contact the Health Sci-

ences Advising Office, South Hall, for specific requirements for each school. The following courses are required by most schools.

Biological sciences: six quarters, including one year of laboratory. (Biological Sciences 1A, 1B, Physiology 110, 110L, Microbiology 2 or 102, and 3 recommended).

Chemistry one year general inorganic (Chemistry 1A-1B-1C) and one year organic, with laboratory (e.g., Chemistry 128A-128B-128C and 129A-129B-129C).

Physics: one year, with laboratory (e.g., 5A, 5B, 5C).

English: one year (e.g., English 1, 3, 103).

Mathematics: one year of calculus (e.g., Mathematics 16A-16B-16C).

### Nursing

Two years are usually required to complete prerequisites prior to admission into two- or three-year baccalaureate nursing programs. An accelerated program is also available at a limited number of universities. In addition to the general requirements listed here, students must obtain a degree in the subject of their choice. General requirements include:

Chemistry 1A, 1B, 8A, 8B.

English 1.

Human Anatomy 101, 101L.

Microbiology 2 or 102, and 3.

Physiology. Recommended: Physiology 2-2L or 110-110L.

Psychology 1.

Sociology 1.

Recommended courses include: Nutrition 10 or 101 or 110; Human Development 100A or Psychology 112; Anthropology 2; Rhetoric and Communication 3; Physics 6A, 10; Family Practice 92C, 192B; Community Health 101; Biological Sciences 19, Psychology 16; Sociology 127, 154.

Specific requirements vary from school to school and are subject to change; students are advised to contact specific schools regarding requirements. An R.N. license may also be earned through associate degree programs (A.D.N.) offered by community colleges or through hospital diploma programs.

### Occupational Therapy

Basic preprofessional training may be taken either at the undergraduate or graduate level. Students must apply to another school to obtain professional training. Applicants are expected to be proficient in some arts and crafts activities and preferably knowledgeable in some industrial arts and recreational skills. Experience in the field is strongly recommended.

Biological Sciences 1A

Chemistry 1A, 1B, 1C

English 1 or 3

Human Anatomy 101, 101L

Human Development 100A-100B or Psychology 112

Physiology 2-2L or 110-110L (110-110L recommended)

Psychology 1, 168

Sociology: one course or Anthropology 2

Suggested electives: Human Development 100C, 102, 130, 131, 141; additional psychology; Physics 5A, 5B, 5C, 10; Physiology 111A-111B, 112-113; Community Health 101; Genetics 10; Nutrition 10; art and design courses; Physical Education 103, 105, 113, 125, 131; Family Practice 92C, 192B; Rhetoric and Communication 1, 3; Microbiology 2, 3. CSU San Jose requires a "skills" course (i.e. drawing, ceramics, weaving).

### Optometry

Two to five years minimum preparation is required prior to admission into a four-year Doctor of Optometry degree curriculum. Students must participate in the Optometry Admission Testing Program, one year prior to projected date of admission. Inquire at the Health Sciences Advising Office for test dates. Check individual catalogs for exact prerequisites.

General Biology and/or Zoology: Biological Sciences 1A, 1B, and one upper division elective in Biological Sciences or Zoology;

Microbiology 2 or 102, and 3;

Human Anatomy 101 and 101L;

Physiology 110 and 110L (required only by UC Berkeley)

Chemistry: one year of general (Chemistry 1A, 1B, 1C) and two quarters of organic with laboratory (e.g., Chemistry 8A, 8B). Required by a few schools: 9 units of organic chemistry.

English: one year (e.g. English 1, 3, 103). Rhetoric courses may fulfill this requirement.

Mathematics 16A-16B. Required by some schools: Mathematics 16C; Statistics 13.

Physics 5A, 5B, 5C.

Psychology: two courses, Psychology 1 and one upper division course (e.g., Psychology 112, 168).

Suggested electives: economics, sociology, biochemistry, additional biological sciences, additional statistics.

### Pharmacy

One to two years minimum preprofessional course work is required prior to admission to professional training. Students may be required to take the Pharmacy College Admission Test one year prior to projected date of admission. Each school has its own requirements; experience in the field is highly recommended. Check individual catalogs.

Biological sciences (one year with laboratory). Zoology 100; Microbiology 2 or 102, 3; Biological Sciences 1A, 1B, 1C.

Chemistry: one year of inorganic chemistry with laboratory (Chemistry 1A-1B-1C); one year of organic with laboratory (Chemistry 128A-128B-128C-129A-129B-129C). UCSF requires Chemistry 5. UOP B.S. degree program has general education requirements but does not require organic chemistry.

Economics. One macroeconomics course (Economics 1B).

English, one year: one each of composition, literature and one other.

Mathematics 16A-16B (-16C required by some schools) and Statistics 13 (recommended).

Physics: one year physics with laboratory (Physics 5A, 5B, 5C).

Psychology: one course, such as Psychology 1.

Rhetoric and Communication 1, 3 or 10.

Suggested electives: courses in behavioral psychology, speech, communication, sociology, anthropology, history, and political science.

## Physical Therapy

Basic preprofessional training is available for both the undergraduate and graduate levels; students must obtain professional training from another school. Each physical therapy program has its own specific requirements; therefore, students should contact the school of their choice. Experience in the field is strongly recommended. Most graduate programs require the Graduate Record Exam (GRE) for admission. General requirements include:

Biological Sciences 1A

Chemistry: 1A, 1B, 1C. Recommended: 8A, 8B

Computer Science Engineering 10. Required by some schools

English, one year

Human Anatomy 101, 101L

Physics, one year

Physiology 110-110L (required by majority of schools)

Psychology 1 and 168

Statistics 13

Suggested electives: Biological Sciences 1B; Human Development 100A- 100B or Psychology 112; Human Development 100C, 131, 141; Microbiology 2 and 3; Sociology 1, 3; Zoology 106, 143; Anatomy 215; Physical Education 101, 102, 103, 105, 113, 125, 131; Rhetoric and Communication 1, 3; Community Health 101 (required only by University

of the Pacific); Family Practice 192B; additional psychology, and additional biology.

## Physician Assisting

Physician assistant programs often require courses in English composition, sociology, psychology, chemistry, anatomy, physiology, microbiology, mathematics, and cultural anthropology. Additionally, one to two years of direct patient care (i.e., nurse, nurses aide, EMT, orderly, corpsman) are normally required. The majority of the programs are for training people who are interested in assisting the primary care physician in underserved areas; however, specialty training is available. Physician's assistants work in a wide variety of settings.

## Speech Therapy

Students must apply to another school for professional training through a master's degree or special teaching credential program.

Speech therapy and audiology programs are highly specific in their entrance requirements at both the undergraduate and graduate levels. UC Davis offers courses that satisfy a few of the requirements, however, it has no preprofessional major for these fields. For information on courses at Davis which are acceptable toward specific programs in speech therapy and audiology, you may contact either the Health Sciences Advising Office or the professional program in which you are interested.

**School of Medicine, UC Davis:** Consult this catalog, the *School of Medicine Bulletin*, or the Office of Student Affairs, School of Medicine, 916-752-3170.

**School of Veterinary Medicine, UC Davis:** Consult this catalog, the *Announcement of the School of Veterinary Medicine*, or the Office of Student Services, School of Veterinary Medicine, 916-752-1383.

## REFERENCE BOOKS

School catalogs and reference texts are available in the Periodicals Room of the Shields Library, the Health Sciences Library, or the Health Sciences Advising Office.

Some recommended publications are as follows:

*American Universities and Colleges*, edited by the American Council on Education.

*Graduate Programs and Admissions Manual*, published by the Graduate Record Examination Board and the Council of Graduate Schools in the United States.

*Admission Requirements of American Dental Schools*, published by the American Association of Dental Schools.

*Admissions to Schools and Colleges of Optometry*, published by the American Optometric Association.

*Medical School Admission Requirements U.S. and Canada*, published annually by the Association of American Medical Colleges.

*Pharmacy School Admission Requirements*, published annually by the American Association of Colleges of Pharmacy.



# School of Law

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## Deadline

**February 1** Deadline for filing applications for admission for 1991-92 to the School of Law

## General Information

The School of Law offers a three-year professional curriculum leading to the degree of Juris Doctor. In addition to the traditional professional curriculum, the School provides professional skills training in interviewing and counseling, negotiation and dispute resolution, and trial practice. It also offers opportunities for practical experience through clinical programs and for in-depth study of an area of law in an individualized program of classroom work, research, writing, or experience in the community. The School seeks to promote critical evaluation of law and legal institutions in a broad perspective, integrating non-legal disciplines with professional legal education.

The 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.

## Preparation 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. They should gain an understanding of people and institutions and know how to gather and weigh facts, to solve problems, and think creatively. They should be able to read rapidly with comprehension, and express themselves clearly, completely, and concisely, both orally and in writing.

Assistance in program planning may be obtained from the Pre-Law Advising Office, South Hall, 916-752-3009.

For additional information, see the *Official Guide to U.S. Law Schools—Pre-Law Handbook*, published annually and prepared by the Law School Admission Council and the Association of American Law Schools. This book includes material 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. It may be found at college bookstores or ordered from Law Services, Box 2000, Newtown, PA 18940.

## ADMISSION

### Requirements for Admission

Your application for admission to the School of Law must show a record of sufficiently high caliber to

demonstrate your ability to handle the rigors of law study. A bachelor's degree or an equivalent degree from an approved college or university must be earned prior to the time you begin work in the School.

Your application will be reviewed by the School of Law Admissions Committee, which seeks students of demonstrated academic ability, as evidenced by LSAT scores and the undergraduate grade-point average (GPA). The Committee seeks students of diverse backgrounds and considers ethnic and economic factors, 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 in August*.

### Law School Admission Test (LSAT)

All applicants are required to take the Law School Admission Test administered by Law Services. Testing centers have been established for the convenience of applicants in all parts of the United States and in many foreign countries. Tests are given four times a year: February, June, October, and December. If at all possible, you should take the test by October, and in any event not later than December, for admission the following fall. The completed test application blank, accompanied by the fee, must be postmarked at least 30 days before the date of the test to ensure the applicant's being registered.

To obtain application forms, information about the test, specific test dates, and the location of testing centers, write to: Law School Admission Test, Law Services, Box 2000, Newtown, PA 18940. The information booklet is also available in the Law School Admission Office and the Prelaw Advising Office on campus.

### Admission Procedures

Complete details of admission procedures are included in the *Law School Catalog*.

1. Application for admission to the School of Law and to the Graduate Division of the University for the program leading to the degree of Juris Doctor should be made on forms supplied by the School. Application forms and the School catalog may be requested from the Office of Admissions, School of Law, University of California, Davis, CA 95616. *The completed application must be returned to that same office, accompanied by a \$40 nonrefundable application fee* in the form of a check or money order made payable to The Regents of the University of California.

The last date for filing completed application forms, together with all supporting documents, including LSAT scores, Law School Data Assembly Service (LSDAS) reports, and letters of recommendation, is *February 1* of the year in which admission is sought. Early filing of all application materials is strongly recommended and will materially assist the School of Law Admissions Committee in its considerations. Applications received after February 1 will be considered but because applicants are admitted as promptly as possible, late applicants will be at a disadvantage.



2. You must take the Law School Admission Test and submit the Law School Application Matching Form with your application so that the score will be reported to the School. You are urged to take the test as early as possible, and in no event later than December preceding the year in which admission is sought.
3. You should register with the LSDAS no later than December 1 by completing and mailing the registration form supplied with each LSAT information packet. A transcript from each college or university attended must be sent directly to the Law School Data Assembly Service, Law Services, Box 2000, Newtown, PA 18940.
4. An official transcript of college work completed during the first semester or quarter of your senior year *must* be submitted 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 are required to submit directly to the School of Law a final transcript showing the award of a bachelor's degree.
5. Two letters of recommendation from objective and responsible persons to whom you are well known must be provided. At least one of these letters should come from a faculty member under whom you studied while in college. These **letters of recommendation must come directly from the writer or from a college placement center, career center, or college pre-law office.** The Admissions Committee cannot seriously consider your application before two letters have been received.
6. When accepted by the School of Law, you are simultaneously admitted to the Graduate Division on the 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 (see below), you must make separate application to the Graduate Division prior to commencing such studies.

#### Admission to Advanced Standing

If you have completed at least one year of work in another approved law school, you may be considered

for admission to advanced standing with credit for not more than one year of such work. No application for advanced standing will be considered until the Office of Admissions has received transcripts for all prior law school work.

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 (no need to register with LSDAS—a copy of the report previously submitted to the school you are presently attending will suffice); 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. Committee decisions on advanced standing are normally made in late 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 this school.

#### Recruitment of Underrepresented Groups

The students and faculty of the UCD School of Law recognize the great need for lawyers from underrepresented groups. The School, therefore, actively solicits applications from Asian, Black, Hispanic, Native American, Filipino, and other underrepresented students.

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, 818 18th Street N.W., Suite 940, Washington, D.C. 20006.

Scholarships for Indian and Alaskan natives are available from American Indian Scholarships, Inc., 5106 Grant Avenue N.E., Albuquerque, New Mexico 87108. Applicants must be members of federally recognized Indian tribes or Alaskan native villages and must demonstrate need. The deadline for the fall term is June 1.

The Mexican-American Legal Defense and Education Fund (MALDEF) has monies available for Chicano students who have applied to law school. Applications may be obtained by writing to: Mexican-American Legal Defense and Education Fund, 28 Geary Street, 6th Floor, San Francisco, CA 94108.

#### PROFESSIONAL CURRICULUM AND DEGREE

The course of study in the professional curriculum requires six semesters for completion and extends over a period of three years. It is designed 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.

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. Students who fail to attain satisfactory grades may be required to withdraw from the School at the end of any academic year.

Courses taken in summer sessions at other accredited law schools may, with prior permission, be credited toward the units required for the professional degree.

The courses of the professional curriculum are listed in the Programs and Courses section of this catalog.

### Combined Degree Programs

Students with interests in areas such as anti-trust, business, labor law, criminal law, or environmental law, may find a combined degree involving law and another discipline such as economics, business, sociology, or science advantageous. In order to encourage 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. In some instances it may be possible to work on a Ph.D. degree as well.

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 the UC Berkeley School of Business for the M.B.A. degree, and with UCD departments for the M.A. degree in economics and sociology, and with the School of Management for a M.Admin. 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 prior to 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.

### SEMESTER SYSTEM

The School of Law operates on a semester system rather than the quarter system used on the remainder of the Davis campus.

#### Academic Calendar 1990-91

	Fall 1990	Spring 1991
First-year Introductory Program	Mon-Fri, Aug 20-24	
Law School instruction begins	Mon, Aug 27	Mon, Jan 14
Labor Day holiday	Mon, Sept 3	
Thanksgiving holiday period	Thurs-Fri, Nov 22-23	
Martin Luther King, Jr. holiday		Mon, Jan 21
President's Day holiday		Mon, Feb 18
Spring recess		Mon-Fri, Mar 25-29
Law School instruction ends	Fri, Dec 7	Fri, May 3
Reading period	Sat-Tues, Dec 8-11	Sat-Wed, May 4-8
Law School examination period	Wed-Sat, Dec 12-22	Thurs-Fri, May 9-24
Last day of semester	Sat, Dec 22	Fri, May 24
Law School Commencement		Sat, May 25

\*Friday, February 22, is treated as a Monday for class schedule purposes.

### APPLICATION MATERIALS

The catalog of the School of Law and application materials may be obtained by writing to the Office of Admission, School of Law, 115 King Hall, University of California, Davis, CA 95616.



# School of Management

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## Deadline

**April 1** Deadline for filing applications for admission for 1991-92 to the School of Management

## PREPARATION 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 school 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 prior to enrollment in the program:

*Economics*—the introductory courses in micro- and macroeconomics, and one upper division course in microeconomics (Economics 100).

*Mathematics*—an introductory course in calculus (Mathematics 16A).

*Statistics*—one course in elementary statistics (Statistics 13).

Well-developed English reading and writing skills are essential for success in the program.

## APPLICATION

Admission is for the fall quarter only. Application materials may be obtained from the Graduate School of Management and must be completed and returned, with all supporting documents, by *April 1*. In order to allow the timely processing of your application, we have established a deadline of April 1. However, your application may be considered after the deadline. Completed applications for fellowship and graduate scholarships must be filed by *January 15*.

### As indicated in the application form, the basic documents required are:

- transcripts from all institutions of higher education previously attended;
- scores from the Graduate Management Admission Test (GMAT);
- three letters of recommendation;
- a personal statement which discusses career objectives and educational reasons for seeking admission to the program.

Personal interviews are not a requirement, although visits from applicants are welcomed.

## CRITERIA FOR ADMISSION

The major criterion of the committee granting admission is what an applicant has to gain from, and offer

to, the program. 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 averages. Admissions standards and grading policies of the schools attended are also considered. Both verbal and quantitative scores on the GMAT are used to evaluate measurable general aptitude for management. Background and maturity as indicated by employment history, service and activity records, recommendations, and the applicant's personal statement are factors in the committee's evaluation. Professional management experience is not required for admission but is favorably considered.

The Graduate School of Management of the University of California, Davis, prepares men and women for management careers in business, government, and nonprofit enterprise. The School offers the principal components of leading graduate programs of business management in a two-year course of study leading to the Master of Business Administration degree. The Graduate School of Management admitted its charter class in the fall of 1981, and the planned enrollment at maturity is 300.

The two-year program provides 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 computers, information systems and the application of scientific methods to the identification and solution of management problems.

The program has a first-year core which emphasizes concepts and techniques appropriate to management in either the public or private sector so that students, no matter what their special career interests, are prepared to function in either sphere. Courses in the core cover economic analysis, policy analysis, quantitative methods, accounting, budget and control, marketing, finance, and organizational theory. During the second year, students specialize in one of several concentrations including Accounting, Agricultural Management, Environmental and Natural Resource Management, Finance, Management Information Systems, Management Science, Marketing, Public Sector Management, Science and Engineering Management, each with an emphasis in either the public or private sector. Joint degrees in Engineering and Management and Law and Management are also offered. The Graduate School of Management is able to accept well-qualified students into an individualized Ph.D. program. The program is administered by the Graduate Division, but students who are interested should write directly to the Graduate School of Management.

Strong emphasis is placed on individual attention, real-world problem solving, and group dynamics through study groups, teamwork, and special subjects.

# School of Medicine

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## Deadline

**November 1** Deadline for filing applications for admission for 1991-92 to the School of Medicine

## General Information

The Doctor of Medicine degree requires the satisfactory completion of a four-year course of study comprised of 15 consecutive quarters. Course work is conducted on the Davis campus, at the University of California, Davis, Medical Center, Sacramento; and in nearby affiliated hospitals.

## ADMISSION POLICIES

The class entering in the fall will be limited to ninety-three students selected on the basis of academic achievement, academic promise, and personal characteristics. The Admissions Committee uses these criteria to determine if a candidate will be able to complete satisfactorily the requirements of the medical curriculum and become excellent medical practitioners. Factors taken into consideration include scholastic records, Medical College Admission Test performance, and reports of teachers, advisers, and interviewers with regard to intellectual capacity, motivation, emotional stability, and personal dedication.

The majority of openings in the entering class will be awarded to students who are legal residents of the State of California. The School of Medicine participates in the program of the Western Interstate Commission for Higher Education (WICHE). Further information may be obtained by communicating with this Commission at Post Office Drawer P, Boulder, CO 80302.

**Applicant Selection.** The School of Medicine selects students for admission with a view to meeting the needs of society, of the medical profession, and of the School. Because we live in a pluralistic society, and the educational experience is enhanced by the interaction of students from various backgrounds, the School desires diversity in its student body. This is reflected in the School's commitment to expand opportunities in medical education for individuals from groups underrepresented in medicine as the result of societal discrimination and to increase the number of physicians practicing in underserved areas. Therefore, the Admissions Committee, which is composed of individuals from a variety of cultural backgrounds and which is representative of a broad spectrum of medical sciences, evaluates applicants in terms of all relevant factors. These include academic credentials, with due regard to how they may have been affected by disadvantages experienced by the applicant, such personal traits as character and motivation, experience in the health sciences and/or the community, career objectives, and the ability of the individual to make a positive contribution to society, the profession, and the School.

## Application Procedures

The School of Medicine participates in the centralized American Medical College Application Service

(AMCAS). Application request forms are available from the School's Admissions Office after March 15 of each year. You may also secure this form from other AMCAS-participating medical schools or from your premedical adviser. You need to submit only one application and one set of official transcripts to AMCAS, regardless of the number of member schools to which you are applying.

Upon receipt of the application request form, AMCAS will send you an application for admission, together with descriptive material and instructions. The completed application and other required credentials should be submitted directly to AMCAS for verification, reproduction, and immediate distribution to the medical schools you have indicated.

After your AMCAS application has been received by the School of Medicine, the Admissions Office will notify you and may request two letters of recommendation along with a nonrefundable application fee of \$40. These items should be sent directly to the Chairperson of the Admissions Committee, School of Medicine, University of California, Davis, CA 95616, and not to AMCAS. Recommendations can be in the form of a report by a premedical advisory committee at the college or university where you are enrolled or letters from two faculty members who are familiar enough with you and your abilities to make a meaningful evaluation. It is required that one letter be from a science instructor and the other from a non-science instructor.

Applications will be accepted by the Admissions Committee between June 15 and November 1. It is strongly recommended that you make an early request for application materials from AMCAS and see that the necessary supporting items reach the Committee as soon as possible after the School of Medicine notifies you of receipt of your completed application from AMCAS. The Committee reviews only complete application files and schedules interviews for highly qualified applicants throughout the application period and beyond.

A personal interview is usually required before a place in the first-year class can be offered. However, because of the large number of applicants, it is not possible to interview each one, and for this reason interviews are held only at the invitation of the Admissions Committee. It is highly desirable that interviews take place at the medical school in order to provide you with first-hand knowledge of programs and facilities and give you the opportunity to meet some of the students. Where circumstances warrant, interviews may be arranged by the Admissions Committee at other locations.

You will be notified of your status as soon as possible after a decision has been reached. As decisions are made, letters of acceptance are sent; this can be as early as mid-October and as late as September of the following year.

## Transfer with Advanced Standing

Students may be admitted by action of the Admissions Committee at levels more advanced than the regular entering level but not beyond the beginning of the third year. Such applicants must meet the

entrance requirements for regular status in the School of Medicine, must satisfactorily complete courses elsewhere that are substantially equivalent to those offered in the School of Medicine, and must meet the necessary requirements for the advanced status requested. Applicants may also be required to pass examinations to establish their qualifications for admission. An advanced standing applicant must be a student in good standing at an approved medical school. At UCD, the second-year classes begin work in early August and third-year classes begin work in early July. Applications for admission to advanced standing will be accepted until *January 1* of the year in which admission is sought.

### Premedical Scholastic Requirements

The New Medical College Admission Test (MCAT) results must be available when your application is reviewed, so you should take the MCAT by the spring prior to application. Information can be obtained at your undergraduate institution or directly from MCAT Registration, Box 414, Iowa City, Iowa 53340. To be acceptable, the MCAT must have been taken no earlier than 36 months prior to the date of application and no later than the fall prior to the year of anticipated matriculation.

Beginning with the class entering the School of Medicine in fall 1990, each applicant for admission:

- A. Must have completed at least three years of study in an accredited college or university in the United States or Canada. 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. Must have completed satisfactorily before matriculation each of the following courses:

	Quarter Units	Semester Units
1. English, 1 year or its equivalent.	12	6
2. Biological science, 1 year including laboratory, or its equivalent.	12	8
3. General chemistry, 1 year including laboratory, or its equivalent.	12	8
4. Organic chemistry, 1 year or its equivalent. If two or more undergraduate organic chemistry courses are offered, it is recommended that you elect the more rigorous option.	12	8
5. Physics, 1 year or its equivalent.	12	8
6. Mathematics, course work sufficient to satisfy prerequisites for integral calculus. (Course work through integral calculus is recommended. You will find helpful experience and knowledge gained in biochemistry, genetics, and embryology.)	6	4

- C. Must demonstrate the potential to perform academically at least as well as the average of the current first year class. This reflects the School of Medicine's generally higher standards and our

emphasis on potential as judged from the application as a whole, including but not limited to MCAT and GPA scores.

For additional information, contact the School of Medicine Admissions Office or request the *School of Medicine Bulletin* from the medical school Admissions Office.

### School of Medicine Calendar 1990-91

The School of Medicine operates on a different schedule from the remainder of the campus. A more detailed academic calendar may be obtained from the Office of Curricular Support, 2427 Medical Sciences 1A.

#### SUMMER QUARTER 1990

<b>Instruction begins</b> for 3rd- and 4th-year students	Mon, July 2
<b>Instruction begins</b> for 2nd-year students (electives)	Mon, July 2
<b>Instruction begins</b> for 2nd-year (regular curriculum)	Mon, July 30
<b>Instruction ends</b> for 2nd-year students	Mon, Sept 10
<b>Final exams</b> for 2nd-year students	Sept 12-14
<b>Instruction ends</b> for 3rd- and 4th-year students	Fri, Sept 21
Academic and administrative <b>holidays</b>	Wed, July 4
	Mon, Sept 3

#### FALL QUARTER 1990

<b>Instruction begins</b> for 3rd-and 4th-year students	Mon, Sept 24
<b>Instruction begins</b> for 1st- and 2nd-year students	Thurs, Sept 27
<b>Exam and study period</b> for 1st-year students	Nov 5-9
<b>Exam and study period</b> for 2nd-year students	Nov 8-14
<b>Instruction ends</b> for 1st- and 2nd-year students	Fri, Dec 7
<b>Final exams</b> for 1st- and 2nd-year students	Dec 10-14
<b>Instruction ends</b> for 3rd- and 4th-year students	Fri, Dec 14
Academic and administrative <b>holidays</b>	Nov 22-23
	Dec 24-25
	Dec 31-Jan 1

#### WINTER QUARTER 1991

<b>Instruction begins</b> for 2nd- to 4th-year students	Wed, Jan 2
<b>Instruction begins</b> for 1st-year students	Mon, Jan 7
<b>Exam and study period</b> for 2nd-year students	Feb 7-13
<b>Exam and study period</b> for 1st-year students	Feb 12-15
<b>Instruction ends</b> for 2nd-year students	Wed, Mar 13
<b>Final exams</b> for 2nd-year students	Mar 14-20
<b>Instruction ends</b> for 1st-year students	Mon, Mar 18
<b>Final exams</b> for 1st-year students	Mar 19-26
<b>Instruction ends</b> for 3rd- and 4th-year students	Fri, Mar 22
Academic and administrative <b>holidays</b>	Mon, Jan 21
	Mon, Feb 18

#### SPRING QUARTER 1991

<b>Instruction begins</b> for 2nd- to 4th-year students	Tues, Mar 26
<b>Instruction begins</b> for 1st-year students	Mon, April 1
<b>Exam and study period</b> for 2nd-year students	April 22-24
<b>Exam and study period</b> for 1st-year students	May 6-10
<b>Instruction ends</b> for 2nd-year students	Wed, May 22
<b>Final exams</b> for 2nd-year students	May 24-29
<b>Instruction ends</b> for 4th-year students	Thurs, June 6
<b>Instruction ends</b> for 1st-year students	Fri, June 7
<b>Final exams</b> for 1st-year students	June 10-14
<b>Instruction ends</b> for 3rd-year students	Fri, June 14
Academic and administrative <b>holidays</b>	Mon, Mar 25
	Mon, May 27

# School of Veterinary Medicine

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**Deadline**

**November 1** Deadline for filing applications for admission for 1991-92 to the School of Veterinary Medicine

**General Information**

The Doctor of Veterinary Medicine (D.V.M.) degree is granted upon completion of a course of study that usually requires six years. The final four years must be spent in the professional veterinary medical curriculum. Many students planning a career in veterinary medicine broaden their educational experience by completing the baccalaureate degree before applying to the professional school.

**PREPROFESSIONAL TRAINING AND REQUIREMENTS**

Applicants must have completed 108 quarter units (72 semester units) in an accredited college or university before entering the School of Veterinary Medicine. Courses taken at other institutions may vary in units.

You should plan your preveterinary medical education carefully. The required courses should be spaced to permit maximum scholastic achievement. The undergraduate program should include plans for obtaining a baccalaureate degree. An undergraduate major should be selected on the basis of individual interest and aptitude; there is no advantage gained toward admission by selecting one major over another. Many students planning to enter veterinary school have definite areas of interest within the general field of veterinary medicine. These individuals are encouraged to take courses (for example, computer science, agricultural economics, molecular and biochemical genetics) which will broaden their background in these areas. Some specialized areas include laboratory animal medicine, exotic animal medicine, public health, food animal practice, and biomedical research. Substantial experience with animals, which should include working with veterinarians, is required. This experience should entail more than having had family pets. The requirement can be fulfilled with 4 1/2 week-equivalents (180 hours) if it includes relevant experience with types of activities that give an appreciation and understanding of the profession of veterinary medicine. This should include experience with several animal species so as to understand the breadth of the profession. **The Admission Committee will evaluate animal experience qualitatively. Evaluation of animal experience is derived from the application, narrative and letters of evaluation. The experience requirement must be met in order to have an application evaluated by the Admission Committee.**

**Subject Requirements**

Science courses

*Lower Division*

Chemistry (general, qualitative, organic, including laboratories) ..... 21

Quarter  
Units  
46

Physics (general, no laboratory required) ..... 6  
Biology (no laboratory required) ..... 5  
Zoology (including laboratory) ..... 5

*Upper Division*

Genetics (no laboratory required) ..... 4  
Embryology (no laboratory required) ..... 4  
English composition and additional English or  
Rhetoric and Communication ..... 12  
Statistics ..... 4  
Humanities and/or Social Sciences ..... 12

**Total 73**

Following is a list of courses taught on the UC Davis campus which fulfill the preceding subject requirements.

**Units***Lower Division*

Biological Sciences 1A, (5) ..... 5  
Chemistry 1A, 1B, 1C, 8A, 8B, (5,5,5,3,3) ..... 21  
Physics 1A, 1B, (3,3) ..... 6  
Biological Sciences 1B, (5) ..... 5

English 1 and additional English or  
Rhetoric and Communication, (4,4,4) ..... 12

Statistics 13 or Agricultural Science and  
Management 150, (4,4) ..... 4

Humanities and/or Social Sciences, (4,4,4) ..... 12

*Upper Division*

Genetics 100, (4) ..... 4  
Zoology 100, (4) ..... 4

**Total 73**

If you complete the requirements in an institution other than the University of California, Davis, you are urged to check carefully the catalog of your college to be sure you are taking courses comparable in content.

**Application Procedures**

Students are admitted to the School of Veterinary Medicine only in the fall. Applications may be obtained any time after July 1 by writing to the Office of the Associate Dean—Student Services, School of Veterinary Medicine, University of California, Davis, CA 95616 or by calling 916-752-1383. Applications, accompanied by a nonrefundable application fee of \$40 must be received by this office no later than **November 1**. All applicants are required to take the General Aptitude (including Analytical) and Subject Test in Biology of the Graduate Record Examination (GRE). GRE SCORES RECEIVED FROM THE NOVEMBER ADMINISTRATION OR LATER ADMINISTRATIONS FOR THE YEAR THE APPLICATION IS FILED WILL NOT BE ACCEPTED FOR CONSIDERATION. Applications for the examinations and additional information may be obtained from the Educational Testing Service, Box 23470, Oakland, CA 94623-0470.

The GRE must be taken within the five-year period prior to the time the application is submitted. The highest scores will be used when the GRE is taken more than once.

Students interested in admission to the School of Veterinary Medicine are urged to request an *Announcement of the School of Veterinary Medicine* at an early date so that all minimum academic requirements and deadlines are met.

Applicants with disadvantaged backgrounds (cultural, economic, social, educational, disabled, and other

factors) are encouraged to apply to the Veterinary Medical Opportunity Program (VMOP). For further information and advising services, contact the Director of Student Affirmative Action by writing to the Office of the Associate Dean—Student Services or by calling 916-752-1806.

## **Admission to the School of Veterinary Medicine**

Evaluation is based on academic and nonacademic records. The academic record is divided into the required science grade-point average, cumulative grade-point average, and grade-point average for the last two years of undergraduate studies. The scores from the Graduate Record Examination are included in the evaluation of your academic record. The principal nonacademic criteria are your narrative statement, letters of evaluation, and personal interview. Other criteria considered helpful by the Faculty Committee and Dean of the School of Veterinary Medicine may be used in the selection process. The minimum acceptable grade-point average for an applicant to be considered for admission to the School is 2.50 in both the required science units and the cumulative undergraduate work.

Since scholastic achievement in the required science courses is a very important criterion for admission to the School, the Passed/Not Passed option should be avoided.

Work-experience with animals and a familiarity with the veterinary medical profession are considered significant factors in demonstrating motivation and a sincere interest in the profession. Comprehensive letters of evaluation are an important consideration in the review of an application.

Residents of the state of California will be given priority for admission to the School of Veterinary Medicine. A small number of uniquely qualified applicants who are not California residents may be admitted as nonresidents. Residents of states participating in the Western Interstate Commission for Higher Education (WICHE) will be considered as residents for purposes of admission. Based on agreements with WICHE, a small number of applicants from WICHE states may be admitted with WICHE financial support. Other applicants from WICHE states may be admitted but only as nonresidents. For information related to the WICHE program, write to the Western Interstate Commission for Higher Education, Post Office Drawer P, Boulder, CO 80302. The criteria for determining residency are explained in the Statement of Legal Residence in the Appendix of this catalog. Specific questions should be addressed to the Legal Analyst — Residence Matters, 590 University Hall, University of California, Berkeley, CA 94720. No other persons are qualified to give rulings on residency.

Any applicant applying for admission to the School of Veterinary Medicine from a state other than California, must enclose with his or her application, course descriptions of all required science courses. This may be accomplished by sending current school catalogs or by copying relevant course descriptions from school catalogs.

In addition, applicants who have received part or all of their education in a country other than the United



States must include: 1) a certified English version of their college transcripts; and 2) if English is their second language, official scores from the Test of English as a Foreign Language (TOEFL) examination taken within the five-year period prior to the time the application is submitted.

## **DEGREES**

### **Requirements for the Bachelor of Science Degree in Veterinary Science**

Any student in the School of Veterinary Medicine who does not hold a baccalaureate degree, but has satisfactorily completed the first two years of the professional curriculum and has satisfied the general University requirements (see the Bachelor's Degree Requirements section in this catalog), is eligible to receive a Bachelor of Science degree in Veterinary Science.

### **Requirements for the Doctor of Veterinary Medicine Degree**

A candidate for the Doctor of Veterinary Medicine degree must comply with the following requirements:

- Fulfill the academic standards set forth by the faculty of the School of Veterinary Medicine
- Possess good moral character
- Complete the bachelor's degree requirements in one of the colleges or schools of the University of California or at another accredited college or university
- Study veterinary medicine for the equivalent of 12 quarters of 12 weeks each (the last six quarters must have been spent in the School of Veterinary Medicine, University of California, Davis)
- Maintain a grade-point average of 2.0 (C), computed on all courses taken in the School

- Satisfactorily complete all required work as determined by the faculty of the School

### **The Master of Preventive Veterinary Medicine Degree**

Applicants for candidacy to the Master of Preventive Veterinary Medicine (MPVM) degree program must have completed the Doctorate in Veterinary Medicine or the equivalent; final admission decisions rest with the Admissions Committee, MPVM program. An option should be selected from the four listed below at the time of application. Completed application materials must be submitted no later than *ninety days prior to the quarter of planned enrollment*. Application forms can be requested from the Director, MPVM Program, School of Veterinary Medicine, University of California, Davis, CA 95616.



Candidates for the MPVM degree must satisfactorily complete a total of 50 units of course work while in residence. This includes 28 units of core required course work, 10 units of research in a field appropriate to the chosen option, and additional units of approved elective courses. One requirement of the MPVM program is to complete a research study which culminates in a written report and oral presentation. A committee, consisting of three faculty members, reviews each paper for acceptability and assigns an appropriate grade.

The degree program extends over a minimum of twelve months to a maximum of two years. Students who intend to complete the program in one calendar year must enroll in August unless they have recently completed and performed satisfactorily in a statistics course that has been approved by the MPVM Director and the Epidemiology and Preventive Medicine 400 instructor at the time of the student's acceptance into the program. Students meeting this requirement may enroll at the beginning of the fall quarter in late September. Students who intend to remain in the program for more than one year may enroll in the optimal course sequencing, but arrival in August is recommended.

Four options offered under the MPVM Program permit students to select an area of study that best identifies their individual interests and needs. The options and advisers are as follows:

1. *Epidemiology and Herd Health Management*: statistics, epidemiology, animal health economics, and disease control

Adviser: W. Hird

2. *Veterinary Public Health*: veterinary medicine applied to food safety and zoonoses

Adviser: C. Genigeorgis

3. *Laboratory Science*: roles of diagnostic laboratories in animal disease surveillance and disease control

Adviser: R. Yamamoto

4. *Veterinary Programs Administration*: administration of programs for control of animal diseases, veterinary laboratories, research, or educational veterinary service

Adviser: C. W. Schwabe

Inquiries regarding the program should be directed to the Director, MPVM Program, School of Veterinary Medicine, University of California, Davis, CA 95616.

### **The Master of Science and Doctor of Philosophy Degrees**

General information regarding these degrees will be found in the *Announcement of the Graduate Division*, which may be obtained from the Graduate Division on the Davis campus. Additional detailed information may be obtained by writing the chairperson of the department in which you wish to study.

# Programs and Courses

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## COURSE DESIGNATIONS

The *Class Schedule and Room Directory*, available several weeks before the beginning of each quarter, gives class hours and room numbers, changes to the *General Catalog*, and the most up-to-date information on registration and enrollment procedures. A supplement with changes to the *General Catalog* and the *Class Schedule and Room Directory* is available for fall quarter.

Here is a sample of how a course is listed in this catalog.

**190. Proseminar in International Agricultural Development (1) I, II, III. The Staff**

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.)

**Top line:** course number; title; units; quarters offered; instructor(s).

**Paragraph following:** course setup; prerequisite; description; grading if other than letter grading.

The quarter in which a course is intended to be given is shown as follows:\*

- I. Fall Quarter (September to December)
- II. Winter Quarter (January to March)
- III. Spring Quarter (April to June)
- IV. Summer Quarter (July to September) for students in the School of Medicine only

\*Courses in the School of Law:

I. refers to Fall Semester (August - December)  
II. refers to Spring Semester (January - May)

When a course is listed to be offered in even-numbered years or odd-numbered years only, the year involved would be that in which the quarter occurs, e.g., fall quarter 1990 would be an even-numbered year and winter and spring quarters 1991 would be odd-numbered years.

A series of course numbers followed by two or three letters (for example, Animal Science 49A-49B-49C) 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 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.

### PREREQUISITES

Prerequisites for courses should be noted carefully; the responsibility for meeting these requirements is entirely 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, a prerequisite that requires that you complete 84 units before enrolling may not be waived.

## 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.

**Variable-Unit Courses** (see Academic Information section for enrollment procedures) include:

- **92 (Internship)** courses enable individual students to obtain practical experience to complement their educational goals or to explore potential career interests and opportunities.
- **97T (Tutoring) and 97TC (Tutoring in the Community)** courses allow students to tutor in a subject in which they are proficient—generally in their major field—while enrolled as undergraduates.
- **98 (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 which cannot be accommodated within the formal course structure.

**Autotutorial Courses** are courses in which students instruct themselves at their own pace. These courses can be identified by the letters AT on their course numbers, e.g., 1ATA-1ATB-1ATC, 31ATA, 31ATB.

**California Articulation Number (CAN) System.** UC Davis participates in the CAN System. This system uses a common number to identify some of the transferable, lower division, introductory courses commonly taught within each academic discipline on California college campuses. The system assures students that CAN courses on one participating campus will be accepted "in lieu of" the comparable CAN courses on another participating campus. For example: CAN Economics 2 on one campus will be accepted for CAN Economics 2 on another participating campus. Each campus, however, retains its own numbering system.

In this catalog, the CAN designator is found at the end of the course description of each approved CAN course (e.g. CAN Anth 2, CAN Econ 1A).

For additional information contact the Relations with Schools/EOP Outreach Office, 916-757-3108.

### Upper Division Courses

These courses, **numbered 100-199**, are open to all students who have met the necessary prerequisites as indicated in the 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** (see Academic Information section for enrollment procedures) for upper division credit include:

- **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 prior to enrollment.
- **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.

- **197T (Tutoring) and 197TC (Tutoring in the Community)** are the upper division counterparts of 97T and 97TC.
- **198 (Directed Group Study)** courses are the upper division counterparts of course 98, and are for students judged to have adequate background in the subject proposed for study.

- **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.

**Autotutorial Courses** can also be upper division courses (see under Lower Division Courses). Such courses would read, e.g., 105AT, 119AT, 141AT.

**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 students 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 variable-unit 299 or 299D courses is Satisfactory/Unsatisfactory.

## PROFESSIONAL COURSES FOR TEACHERS AND NURSE PRACTITIONERS

Courses **numbered 300-399** are (1) teacher-training courses in the Division of Education and in other departments and are especially intended for teachers or prospective teachers. Included are courses designed to provide instruction to teaching assistants. (2) Also included are courses for certification of family nurse practitioners and physician assistants. 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 Division before enrolling in 400 series courses to determine if graduate credit may be awarded for the course in question (also note the dagger (†) footnote in prerequisites).

**Note:** Undergraduates should refer to their college's section regarding any restrictions on degree credit for courses in the 200, 300, or 400 series.

## KEY TO FOOTNOTE SYMBOLS

The following symbols are used throughout the Programs and Courses section to indicate:

\* Not to be given 1990-91

† Approved for graduate degree credit

<sup>1</sup>Absent on leave, 1990-91

<sup>2</sup>Absent on leave, Fall Quarter 1990 (Semester, for Law School)

<sup>3</sup>Absent on leave, Winter Quarter 1991

<sup>4</sup>Absent on leave, Spring Quarter 1991 (Semester, for Law School)

<sup>5</sup>In residence at President's Office (University Administration)

<sup>6</sup>In residence at another campus

**The course offerings listed in this catalog are subject to change without notice. For more current quarter offerings, refer to the *Class Schedule and Room Directory* available in the UCD Bookstore. A Supplement to the *Class Schedule and Room Directory* and *General Catalog* is published for fall quarter.**



## Afro-American Studies

(College of Letters and Science)

Vincent Crockenberg, Ph.D., Acting Director  
Program Office, 467 Kerr Hall (916-752-1548)

### Committee in Charge

Cynthia Brantley, Ph.D. (*History*)  
Richard T. Curley, Ph.D. (*Anthropology*)  
Carl C. Jorgensen, Ph.D. (*Sociology*)  
Clarence Major, Ph.D. (*English*)  
Jacquelyn Mitchell, Ed.D. (*Afro-American Studies*)  
Marc Pilisuk, Ph.D. (*Applied Behavioral Sciences*)  
Patricia Turner, Ph.D. (*Afro-American Studies*)  
Clarence E. Walker, Ph.D. (*History*), Chairperson  
David Scofield Wilson, Ph.D. (*American Studies*)

### Faculty

Jacquelyn Mitchell, Ed.D., Associate Professor  
Patricia Turner, Ph.D., Assistant Professor

### The Major Program

The Afro-American Studies Program provides students with directed, in-depth intellectual exposure to the ideas, lifestyles, history, and political behavior of Black peoples throughout the world. Though the courses offered by the Program are disproportionately concerned with Afro-America, affiliated courses offered by instructors formally housed in other departments throughout the University broaden students' access to courses on Africa, Afro-America, and other Black experiences throughout the diaspora. Students who choose an Afro-American Studies major or minor should anticipate a close working relationship with a faculty member.

Upon completion of this program, students will be prepared for graduate work in any discipline requiring a broad social science background.

### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b>	<b>36</b>
Afro-American Studies 10	4
Two courses from Anthropology 2; Economics 1A, 1B; Geography 2; Sociology 1; Political Science 1, 2; Psychology 1...8	
Two courses from Chicano Studies 10; Native American Studies 1, 10; American Studies 45; Asian American Studies 1, 2	8
History 27A, 27B	8
Music 28	4
One course from Statistics 13, Sociology 46A, or Psychology 41	4
<b>Depth Subject Matter</b>	<b>36</b>
A coordinated program of upper division courses, selected and approved in consultation with the major advisers to include:	
Core courses: Afro-American Studies 101, 110, 120	12
Additional upper division units chosen to reflect the student's major emphasis	24
<b>Total Units for the Major</b>	<b>72</b>

### Major Program Emphasis

The following areas of emphasis are offered as a guideline for students interested in majoring in Afro-American Studies

*Culture of Afro-Americans emphasis:*  
Afro-American Studies 107, 120, 121; Anthropology 140A, 140B; History 177A, 177B; Political Science 167.

*African emphasis:*

Afro-American Studies 107, 120, 121; Anthropology 140A, 140B; History 115A, 116; Political Science 134, 146.

The above areas of emphasis are not the only areas students may choose for the Afro-American Studies major. However, it should be noted that the major program must (a) be developed in consultation with an Afro-American Studies faculty member, and (b) be approved by the Program's Major adviser. Information regarding the areas of emphasis may be obtained from the Afro-American Studies Office.

### Related Upper Division Courses

Student who contemplate majoring in Afro-American Studies are advised that the following courses are offered by faculty members in other disciplines and focus on African and Afro-American people and their culture.

Anthropology 104, 139A, 139B, 140, 153; Applied Behavioral Sciences 151, 152, 153, 159A, 159B, 172; Art 150; Dramatic Art 155; Education 150; English 179, 181; Geology 125A, 125B; History 102, 115A, 115B, 115C, 116, 177; Music 113B; Political Science 134, 138, 146, 151, 167, 176; Psychology 159; Sociology 129, 130.

**Major Adviser.** V. Crockenberg.

### Minor Program Requirements:

**Afro-American Studies** ..... **24**

Select one course from Afro-American Studies 10, 15, or 80 ..... 4

Select five courses from Afro-American Studies 100, 101, 107, 110, 120, 121, 123, 133, 145A, 145B, 150A, or 150B ..... 20

**American History and Institutions.** This University requirement can be satisfied by completion of Afro-American Studies 10, 100, 120, 121. (See also under University requirements.)

### Courses in Afro-American Studies

#### Lower Division Courses

##### 10. Introduction to Afro-American Culture and Society (4) I. Turner

Lecture—4 hours. Introduction to the contemporary Black American experience by critically examining historical, political and social and economic factors that have affected the development and status of Afro-American people.

##### 15. Introduction to Afro-American Humanities (4) II. Major

Lecture—4 hours. Introduction to Afro-American cultural tradition as it evolved from West Africa to the Caribbean, South America and North America via slavery.

##### 80. Introduction to Black Politics (4) I. The Staff

Lecture—4 hours. Introduction to the analysis of Afro-American politics, using conceptual frameworks from political science and other social sciences.

##### 99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

#### Upper Division Courses

##### 100. Survey of Ethnicity in the U.S. (4) II. Turner

Lecture—4 hours. The history, culture, philosophy, and current problems of groups considered ethnic minorities in the United States as viewed by the groups themselves. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2 or Sociology 2.

##### 101. Introduction to Research in the Afro-American Community (4) III.

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.

##### \*107. African Cultural Heritage in the Americas (4) III. The Staff

Lecture—4 hours. Prerequisite: course 110 or consent of instructor. Analysis of African cultural systems

as they adapted to the slave regimes in the antebellum and their retentive mechanisms in the postbellum Americas.

##### \*110. West African Social Organization (4) II. The Staff

Lecture—4 hours. Prerequisite: course 101 or consent of instructor. Ecology, population, social organization, and survival culture of West Africa in the pre-colonial, colonial, and post-colonial periods.

##### \*120. Afro-America: Pre-Emancipation (4) II. The Staff

Lecture—4 hours. Prerequisite: course 10 or consent of instructor. Ecology, social organization, and survival culture of Afro-America. Historical and comparative study of Afro-American populations in relation to other groups.

##### 121. Afro-America: Post-Emancipation (4) II. The Staff

Lecture—4 hours. Prerequisite: course 10 or 120, or consent of instructor. Analysis of contemporary Afro-American cultural adaptations and social organizations within the United States.

##### \*123. The Black Female Experience in Contemporary Society (4) III. The Staff

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.

##### \*133. The Black Family in America (4) III. The Staff

Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Analysis of social science research to examine relationship between Black family structures, patterns of functioning, and political, economic, and social conditions. Examination of role differentiation within families by race and social class. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2.

##### 145A. Black Social and Political Thought (4) III. Thompson

Lecture—4 hours. Prerequisite: course 10 or 80, or consent of instructor. Exploration and analysis of Black social and political thought in the Americas.

##### \*145B. Black Intellectuals (4) III. The Staff

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.

##### \*150A. The Afro-American Visual Arts Tradition: A Historical and Cultural Study (4) I. The Staff

Lecture—4 hours. Prerequisite: upper division standing. Afro-American visual arts tradition, folk and formal, in historical and cultural context, from 1600 through Reconstruction.

##### \*150B. The Afro-American Visual Arts Tradition: A Historical and Cultural Study (4) II. The Staff

Lecture—4 hours. Prerequisite: upper division standing. Afro-American visual arts tradition, folk and formal, in historical and cultural context, from Reconstruction to present.

##### 151. Afro-American Vernacular Music and Verbal Arts (4) III. The Staff

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, etc.

##### 197. Tutoring in Afro-American Studies (1-5) I, II, III. The Staff (Chairperson in charge)

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 6 units. (P/NP grading only.)

##### 198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

## Agrarian Studies

(College of Agricultural and Environmental Sciences)

### The Major Program

Agrarian Studies is a multidisciplinary program designed for students who seek the "broad-view" and are challenged by the scientific, philosophical, and cultural concepts important to an understanding of agriculture and its relationship to man. Through a purposeful integration of science and the humanities the major provides a sound general education important for effective leadership in agriculture and in many agriculturally or environmentally related aspects of business, government, international services, or teaching. Depth of understanding in your field of agricultural interest is achieved by the selection of specialized complementary courses or, for those who qualify, by the Senior Honors Thesis.

### B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.)

#### UNITS

**Written/Oral Expression** ..... 8  
See College requirement) ..... 8

**Social Sciences and Humanities** ..... 42

Cultural anthropology or geography (Anthropology 2 or Geography 2-2G).4

Philosophy of biological sciences (Philosophy 10G or 108) ..... 4

Introduction to economics (Economics 1A, 1B, Agricultural Economics 120) ..... 14

Restricted Electives ..... 20

Additional courses selected in consultation with adviser in 3 or more of the following fields: agricultural economics, American studies, anthropology, classics, economics, geography, history, languages; political science, rhetoric, sociology.

**Natural Sciences** ..... 67-68

Chemistry (Chemistry 1A, 1B, 8A, 8B) ..... 16

Biochemistry (Biochemistry 101A, 101B) and/or upper division plant or animal physiology ..... 6

Mathematics (Mathematics 16A plus two of the following: Mathematics 16B, Agricultural Science and Management 21, 150, Computer Science Engineering 30) ..... 10-11

Soil science (Soil Science 100) ..... 4

Ecology (Plant Science 101 or Environmental Studies 100) ..... 4

Biological sciences (Biological Sciences 1A, 1B, 1C) ..... 15

Restricted electives ..... 12

Additional courses in 2 or more fields of science fundamental to agricultural pursuits, e.g., biochemistry, botany, genetics, microbiology, nutrition, physiology, soils, water science, zoology.

<sup>#</sup>Proficiency in a foreign language is contributory to a general education and specifically useful to an understanding of various aspects of agriculture. Students specializing in the agricultural sciences are encouraged to choose French, German, Japanese, or Russian; those interested in agricultural heritage could well choose Greek or Latin; students preparing for international aspects of agriculture or "agribusiness" would have obvious choices based on geographical interests.

### Agrarian Studies Emphasis ..... 20

Perspectives on agriculture (Agrarian Studies 2) ..... 4  
Geography of agriculture (Geography 142) ..... 4  
Food and culture (Food Science and Technology 20) ..... 4  
History of U.S. agriculture (History 188A, 188B) ..... 8

### Agricultural Specialization ..... 30

Major field ..... 18

Courses chosen to provide depth of understanding in one of the following or closely allied fields: animal sciences, food sciences, plant sciences, resource sciences, international agricultural development.

Complementary field ..... 12

Senior Honors Thesis (Agrarian Studies 188H) OR closely related courses in either the natural sciences (e.g., entomology, physiology, soil and water science, etc.) or the social sciences (e.g., agricultural economics, anthropology, geography, political science, etc.) chosen specifically to enhance understanding of agriculture in a scientific or a cultural context.

### Unrestricted Electives ..... 12-13

### Total Units for the Major ..... 180

**Major Adviser.** R. J. Romani (*Pomology*).

## Courses in Agrarian Studies

Questions pertaining to the following courses should be directed to the instructor or to the Pomology Department, 1035 Wickson Hall.

### Lower Division Course

#### 2. Perspectives on Agriculture (4) II. Romani

Lecture—3 hours; discussion—1 hour; one all-day field trip. Prerequisite: introductory course in the chemical or biological sciences recommended. Introduction to agrarian studies, exploring agriculture's vital role in past civilizations and in current societies. A review of important connections between agriculture and the natural and social sciences. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Botany 10.

### Upper Division Course

#### 188. Special Topics in Agrarian Studies (1) III. Romani

Discussion—1 hour. Prerequisite: course 2 or consent of instructor; open to lower division students. Group study of special topics on the relationships between agriculture and the arts and sciences. May be repeated for credit.

#### 188H. Senior Honors Thesis (2-6) I, II, III. Romani

Independent study—2-6 hours; thesis. Prerequisite: Agrarian Studies major; senior standing; overall GPA of 3.25 or higher; consent of master adviser. Two or three successive quarters of guided, scientific and/or scholarly research on an agriculturally-related subject of special interest to the student. (P/NP grading only.) (Deferred grading only, pending completion of thesis.)

## Agricultural and Environmental Chemistry (A Graduate Group)

You-Lo Hsieh, Ph.D., Chairperson of the Group

Group Office, 1480 Chemistry Annex (916-752-1415)

**Faculty.** Includes members from various depart-

ments in the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science.

**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. Detailed information regarding graduate study may be obtained by writing the Group Chairperson.

**Graduate Advisers:** R.G. Burau (*Land, Air, and Water Resources*), R.S. Criddle (*Biochemistry and Biophysics*), C.S. Ough (*Viticulture and Enology*), C.F. Shoemaker and D.S. Reid (*Food Science and Technology*), W.W. Winterlin and T. Shibamoto (*Environmental Toxicology*), S.H. Zeronian (*Textiles and Clothing*).

**Related Courses.** See Biochemistry 201A; Environmental Toxicology 203, 220, 220L; Food Science and Technology 201, 202, 211, 250, 250L; Soil Science 215; Viticulture and Enology 219.

## Courses in Agricultural and Environmental Chemistry

### Graduate Courses

#### 290. Seminar (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Selected topics in agricultural and environmental chemistry, presented by students. (S/U grading only.)

#### 298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

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) I, II, III, summer. The Staff (Chairperson in charge)

Arrangements should be made well in advance with a member of the Group in Agricultural and Environmental Chemistry. (S/U grading only.)

## Agricultural and Home Economics Education

(College of Agricultural and Environmental Sciences)

### Faculty

See under the Department of Applied Behavioral Sciences.

**Major Programs and Graduate Study.** An undergraduate program leading to a bachelor of science degree is offered in Agricultural Education. For graduate study refer to the Graduate Division section in this catalog.

**Teaching Credential Subject Representative.** Secondary Teaching Credentials: Agriculture — J.G. Leising (137 AOB 4); Home Economics — B.G. Goldman (149 AOB 4). Community College Credentials: Agriculture — J.G. Leising (137 AOB 4).

## Courses in Agricultural and Home Economics Education

Questions pertaining to the following courses should be directed to the instructor or to the Department of Applied Behavioral Sciences, Advising Center, 101 AOB 4.

### Lower Division Course

#### 92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)

Field placement—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.)

**Upper Division Courses**

**100. Concepts in Education** (2) I. Pershing, Goldman  
Lecture—2 hours; field observations. Prerequisite: upper division standing. Examination of educational institutions. Implications for those entering careers in teaching. (Sect. 1, Agriculture; Sect. 2, Home Economics.)

**160. Vocational Education** (3) II. Leising

Lecture—3 hours. Philosophy and organization of vocational education, with particular reference to educational principles for agriculture, commerce, home economics, and industry.

**163. Measurement and Evaluation in Teaching** (3)

II. Goldman

Lecture—3 hours. Prerequisite: elementary statistics; upper division standing. Development of selection, use and assessment of evaluation procedures for measuring cognitive, affective and psychomotor growth.

**171. Audio Visual Communications** (2) II. Pershing

Discussion—1 hour; laboratory—3 hours. Concepts and principles of audio-visual communications related to education. (P/NP grading only.)

**172. Multi-Media Productions** (3) III. Pershing

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 171 or consent of instructor. Theory and application of producing multi-media educational programs.

**\*180. Consumer Education** (3) III. The Staff (Goldman in charge)

Lecture—3 hours. Prerequisite: Agricultural Economics 141 or 142 or Consumer Science 100. Examination of values, decision-making processes, lifestyle needs of individuals and communities as a basis for teaching of consumer education in various subject areas at all age levels.

**190. Seminar in Agricultural Education** (2) II. The Staff

Seminar—2 hours. Discussion of selected critical issues in agricultural education. May be repeated for credit with consent of instructor. (P/NP grading only.)

**192. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)

Field placement—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) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)**Professional Courses****300. Directed Field Experience in Teaching** (2) II.

Goldman, Pershing; III. The Staff  
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 once for credit. (Sect. 1, Agriculture; Sect. 2, Home Economics.) (P/NP grading only.)

**301. Planning for Instructional Programs** (3) III.

Leising  
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. (Sect. 1, Agriculture; Sect. 2, Home Economics.)

**302. Teaching Methods in Education** (3) III. Goldman, Leising

Lecture—1 hour; discussion—2 hours. Prerequisite: courses 100, 300 and 301. Development of teaching strategies, with special emphasis on the designing of learning experiences, instructional execution, teaching aids. (Sect. 1, Agriculture; Sect. 2, Home Economics.)

**306A. Field Experience with Future Farmers of America and Supervised Experience Programs**

(4) I. Leising  
Lecture-discussion—2 hours; field work—6 hours. Prerequisite: acceptance into the 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.

**306B. Field Experience in Teaching Vocational Agriculture**

(5-18) I. Leising  
Student teaching (corresponds with public school session). Prerequisite: acceptance into the 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.

**307. Teaching in Secondary Schools** (5-18) I.

Goldman  
Student teaching (corresponds with public school session). Prerequisite: acceptance into Teacher Education Program; courses 100, 300, 301, 302. Supervised teaching in secondary school or community college general agriculture or home economics programs. (Deferred grading only, pending completion of course.)

**323. Resource Development: Agricultural Education** (3) II. Leising

Lecture—3 hours. Prerequisite: courses 306A, 306B. Selection and implementation of community resources in teaching.

**\*381. Family Life Education** (3) III. The Staff (Goldman in charge)

Lecture—3 hours. Prerequisite: upper division standing; courses on the family, sex education, and teaching methods recommended. Current topics in family life education. Review of selected research, resources, curriculum, teaching strategies, and interdisciplinary approaches to family life education at all age levels. Offered in even-numbered years.

**390. Seminar: Issues in Agricultural and Home Economics Education** (2) III. Pershing

Seminar—2 hours. Prerequisite: acceptance into the Teacher Education Program; courses 306A-306B or 307. Discussion and evaluation of current issues, theories and research in home economics and agricultural education. (Sect. 1, Agriculture; Sect. 2, Home Economics.) (S/U grading only.)

ing, financing, and managing business activities.

**B.S. Major Requirements:**

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

UNITS

**Written/Oral Expression** ..... 10-12

See College requirement ..... 7-8

Additional English (English 1, 3, 20, 102, or

103A-G) ..... 3-4

**Preparatory Subject Matter** ..... 35-38

Accounting (Economics 11A-11B) ..... 8

Computer Science (Agricultural Science and Management 21, Computer Science Engineering 10 or 30) ..... 3-4

Economic principles (Economics 1A-1B) ..... 10

Calculus (Mathematics 16A-16B or 21A-21B) ..... 6-8

Statistics (Statistics 13, 103) ..... 8

**Breadth/General Education** ..... 40

(see undergraduate handbook in Department Advising Office for complete list of courses)

Agricultural and environmental sciences (excluding agricultural economics, consumer economics, and applied behavioral sciences).

Natural sciences (including mathematics beyond preparatory subject matter).

Social sciences (excluding economics).

*Note:* Approved General Education courses may be used to simultaneously satisfy breadth for the major and the campus General Education requirement.

**Depth Subject Matter** † ..... 19-21

Micro theory, Agricultural Economics 100A,

100B ..... 8

Quantitative methods, Agricultural Economics 106, 155 ..... 8

Macro theory, Economics 101 or 135 ..... 3-5

**Restricted Electives** ..... 28-32

Options (choose at least one):

(a) Agricultural Economics ..... 28

At least 15 units must be chosen from Agricultural Economics 120, 130, 131, 132, 139, 140, 145, 150. The remaining 13 units must be selected from upper division courses in Agricultural Economics and/or Economics.

(b) Consumer Economics ..... 32

At least 15 units must be chosen from Agricultural Economics 118A, 130, 132, 141M, 142, 143, Consumer Science 100, 135. The remaining 17 units may be chosen from the aforementioned courses or from Agricultural Economics 120, Applied Behavioral Sciences 171, Economics 121A, 121B, 125, 130, Environmental Studies 160, 168A, 168B, Environmental Toxicology 101, 128, 138, Political Science 100, 174.

(c) Managerial Economics ..... 32

Agricultural Economics 18.

At least 12 units must be chosen from Agricultural Economics 112, 118A, 118B, 136, 157, 171A, 171B. The remaining 16 units may be chosen from the aforementioned courses or from Agricultural Economics 120, 130, 131, 132, 139, 140, 143, 145, 150, 190A, 190B, Economics 101, 121A, 121B, 135, 150A, 150B, 151A, 151B, 160A,

## Agricultural and Managerial Economics

(College of Agricultural and Environmental Sciences)

### The Major Program

The major in Agricultural and Managerial Economics is designed for students planning careers or graduate study in the field of applied economics. Preparatory courses are intended to equip students for upper division course work, while breadth subject matter gives them the opportunity to broaden their academic horizons. Depth subject matter provides an analytical framework and tools suitable for analysis of the economic behavior of consumers, firms, and markets. Options within the major permit students detailed examination of areas of interest, with emphasis on theoretical and quantitative analysis.

Each student must specialize in at least one of three options: Agricultural Economics, which focuses on topics related to the production and marketing of foods and fibers; Consumer Economics, which focuses on issues related to consumer decision-making, protection, and welfare; or Managerial Economics, which focuses on topics related to evalua-

†Students graduating with this major are required to attain at least a C average (2.0) in all upper division Agricultural Economics, Consumer Economics, and Economics courses, plus any other upper division courses taken at the University in the depth subject matter.

160B, Political Science 174, 188.
<b>Unrestricted Electives</b> ..... 37-48
<b>Total Units for the Degree</b> ..... 180

**Advising Center** for the major is located in University House Annex (916-752-6185).

**Major Adviser.** S. H. Sosnick (*Agricultural Economics*).

**Graduate Study.** See the Graduate Division section in this catalog.

## Agricultural Economics

(College of Agricultural and Environmental Sciences)

Hoy F. Carman, Ph.D., Chairperson of the Department

Department Office, 118 Voorhies Hall (916-752-1517)

### Faculty

Julian M. Alston, Ph.D., Assistant Professor

Oscar R. Burt, Ph.D., Professor

Bayford D. Butler, M.S., Lecturer

Leslie J. Butler, Ph.D., Lecturer

Michael R. Caputo, Ph.D., Assistant Professor

Hoy F. Carman, Ph.D., Professor

Colin A. Carter, Ph.D., Professor

Harold O. Carter, Ph.D., Professor

Roberta L. Cook, Ph.D., Lecturer

D. Barton DeLoach, Ph.D., Professor Emeritus

Jerry Foytik, Ph.D., Professor Emeritus

Benjamin C. French, Ph.D., Professor

Varden Fuller, Ph.D., Professor Emeritus

Richard D. Green, Ph.D., Professor

Arthur Havener, Ph.D., Professor

Thomas W. Hazlett, Ph.D., Assistant Professor

Dale M. Heien, Ph.D., Professor

Gloria E. Helfand, Ph.D., Assistant Professor

Richard E. Howitt, Ph.D., Professor

Robert D. Innes, Ph.D., Assistant Professor

Lovell S. Jarvis, Ph.D., Associate Professor

Warren E. Johnston, Ph.D., Professor

Desmond A. Jolly, Ph.D., Lecturer

Gordon A. King, Ph.D., Professor Emeritus

Catherine L. Kling, Ph.D., Assistant Professor

Sylvia Lane, Ph.D., Professor Emeritus

Douglas M. Larson, Ph.D., Assistant Professor

Elmer W. Learn, Ph.D., Professor

Samuel H. Logan, Ph.D., Professor

John B. Loomis, Ph.D., Associate Professor

(*Agricultural Economics, Environmental Studies*)

Marc S. Mangel, Ph.D., Professor (*Agricultural Economics, Mathematics*)

Philip L. Martin, Ph.D., Professor

Alexander F. McCalla, Ph.D., Professor

Chester O. McCorkle, Jr., Ph.D., Professor

Quirino Paris, Ph.D., Professor

Refugio I. Rochin, Ph.D., Associate Professor

Richard J. Sexton, Ph.D., Assistant Professor

Lawrence E. Shepard, Ph.D., Professor

J. Herbert Snyder, Ph.D., Professor Emeritus

Stephen H. Sosnick, Ph.D., Professor

Joe J. Stasulat, Ph.D., Lecturer

J. Edward Taylor, Ph.D., Assistant Professor

Marilyn D. Whitney, Ph.D., Assistant Professor

James E. Wilen, Ph.D., Professor (*Agricultural Economics, Environmental Studies*)

**Major Program and Graduate Study.** See the major in Agricultural and Managerial Economics; and for graduate study, see the Graduate Division section in this catalog.

**Major Advisers.** See *Class Schedule and Room Directory*.

**Related courses.** See Environmental Biology and Management 110; Environmental Studies 160, 168A, 168B, 173; and courses in Consumer Economics and Economics.

## Courses in Agricultural Economics

### Lower Division Courses

#### 1. Economic Basis of the Agricultural Industry (4)

III. Learn

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.

#### 18. Business Law (4) I, III. Alcauskas; summer,

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.

#### 49A., 49B., 49C. Field Practice (1) I, II, III. Stasulat

Discussion—1 hour; three field trips. Prerequisite: consent of instructor. Field trips and experiences to observe the various management aspects of Agricultural Production. Emphasis will be placed on developing the student's understanding and awareness of economics and management and their application in agricultural production. (P/NP grading only.)

#### 98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5) I, II, III.

The Staff (Chairperson in Charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

#### 100A. Intermediate Microeconomics: Theory of Production and Consumption (4) I. Helfand; II. Carman; III. Kling

Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A, 1B; Mathematics 16B. Theory of individual consumer and market demand; theory of production and supply of agricultural products, with particular reference to the individual firm; pricing, output determination, and employment of resources under pure competition. (Not open for credit to students who have completed Economics 100 or the equivalent; however, Economics 100 will not serve as prerequisite to course 100B.)

#### 100B. Intermediate Microeconomics: Imperfect Competition, Markets and Welfare Economics (4)

I. \_\_\_\_\_; II. Rochin; III. Whitney

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A. Pricing, output determination, and employment of resources under conditions of monopoly, oligopoly, and monopolistic competition.

#### 106. Quantitative Methods in Agricultural Economics (4) I. Cameron (Economics); II. Larson; III. Taylor

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A, Statistics 103. Statistical methods for analyzing quantitative agricultural economics data: linear and multiple correlation and regression analysis.

#### 112. Fundamentals of Business Organization (4) I, III. Faber; summer, \_\_\_\_\_

Lecture—2 hours; discussion—2 hours. Prerequisite: upper division standing or consent of instructor. The role of organizational design and behavior in business and public agencies. Principles of planning, decision making; individual behavior, motivation, leadership; informal groups; conflict and change in the organization.

#### 113. Fundamentals of Marketing Management (4)

II. The Staff

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; prod-

uct life cycles; the distribution system; manufacturing, wholesaling, retailing. Government regulation and restraints. (Not open for credit to students who have completed course 136.)

#### 118A-118B. Tax Accounting (3-3) II-III. Sosnick

Lecture—2 hours; discussion—1 hour. Prerequisite: Economics 11B. Determination of the federal income tax of employees, proprietors, partners, and corporations and the tax implications of alternative business decisions and methods of accounting.

#### 120. Agricultural Policy (4) I. Learn

Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A. 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. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Economics 1A-1B.

#### 130. Agricultural Marketing (4) I. Alston; II. Whitney

Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A or the equivalent. The nature, function, organizational structure, and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls; cooperative marketing.

#### 131. Agricultural Markets, Prices and Trade (3) III. The Staff

Lecture—3 hours. Prerequisite: course 100B; course 130 recommended. Analysis of economic interdependencies among industries, geographically dispersed markets, alternative product forms and markets separated in time.

#### 132. Cooperative Business Enterprises (3) I. Sexton

Lecture—3 hours. Prerequisite: Economics 1A. Study of cooperative business enterprise in the United States and elsewhere; economic theories of behavior, principles of operation, finance, decision-making, and taxation.

#### 136. Managerial Marketing (4) II. The Staff

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.

#### 139. Futures and Options Markets (3) I. C. Carter

Lecture—3 hours. Prerequisite: course 100A; Statistics 103. 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.

#### 140. Farm Management (5) III. H. Carter

Lecture—5 hours. Prerequisite: Economics 1A. Farm organization and resources; economic and technological principles in decision making; analytical techniques and management control; problems in organizing and managing the farm business.

#### 141. Consumers and the Market (4) II. Heien

Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures. Structure of the market and the effects of its performance on consumers. Agencies aiding and protecting consumers, sources of information available to consumers. (Students who have had or are taking course 100A, Economics 100, or the equivalent may receive only 3 units of credit, so must enroll for course 141M.) General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: non-GE introductory course sequence Economics 1A-1B.

#### 141M. Consumers and the Market (3) II. Heien

Lecture—4 hours. Prerequisite: Economics 1A. Factors affecting consumer expenditures. Structure of the market and the effects of its performance on consumers. Agencies aiding and protecting consumers, sources of information available to consumers. (Students who have had or are taking

course 100A, Economics 100, or the equivalent must enroll for this 3-unit course instead of course 141.) General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: non-GE introductory course sequence Economics 1A-1B.

**142. Personal Finance** (3) I. Shepard; III. B. Butler  
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. (Same course as Consumer Economics 142.)

**143. Investments** (3) II, III. Shepard

Lecture—3 hours. Prerequisite: Agricultural Economics/Consumer Economics 142 or consent of instructor. 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.

**145. Farm and Rural Resources Appraisal** (4) II.

Johnston  
Lecture—3 hours; laboratory—3 hours; field trip. Principles of farm and ranch appraisal; land utilization in relation to problems of development and valuation. Real estate instruments and elements of real estate finance.

**147. Natural Resource Economics** (4) I. Helfand  
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A; enrollment 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.)

**147M. Natural Resource Economics** (2) I. Helfand  
Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A; enrollment 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.)

**\*148. Economic Planning for Regional and Resource Development** (3) II. Rochin

Lecture—3 hours. Prerequisite: Economics 1A and 1B; Mathematics 16A recommended. Relation of resources to economic growth, including regional problems; planning economic development with particular emphasis on resource use in agriculture; regional and national planning by both centralized and decentralized governments.

**150. Agricultural Labor** (4) I. Martin

Lecture—3 hours; discussion—1 hour. Importance of family and hired labor in agriculture; farm labor market; unions and collective bargaining in California agriculture; simulated collective bargaining exercise; effects of unions on farm wages and earnings.

**155. Quantitative Analysis for Business Decisions** (4) I. Paris; II. Heaton; III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A; Statistics 103. Introduction to selected topics in management science and operations research: decision analysis for management, mathematical programming, competitive analysis, and others.

**156. Introduction to Mathematical Economics** (4)

I. Caputo

Lecture—4 hours. Prerequisite: course 100A and 155. Linear algebra for economists; necessary and sufficient conditions in static optimization problems; implicit function theorem; economic methodology and mathematics; comparative statics; envelope theorem; Le Chatlier principle; applications to production and consumer models.

**157. Analysis for Production Management** (4) III.

Logan  
Lecture—4 hours. Prerequisite: course 100A; Statistics 103. Application of economic theory and quantitative methods in analyzing production management problems including inventory control, production scheduling, quality control, simulation, systems approach, and work measurement.

**\*169. Economics of Energy** (4) II. Wilen

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B or the equivalent; introductory course in calculus recommended. Economic concepts necessary to study energy issues. Topics include: petroleum economics, cartel behavior, exploration and development, economics of alternative energy sources, risk and uncertainty, transition to alternative sources, substitutability. Offered in even-numbered years. (Same course as Environmental Studies 169.)

**171A. Financial Management of the Firm** (4) I.

Innes  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 106; Economics 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. (Students who have had or are taking Economics 134 may not receive credit for this course.)

**171B. Financial Management of the Firm** (4) II.

Innes  
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.

**176. Economic Analysis in Resource Use** (3) III.

Larson  
Lecture—3 hours. Prerequisite: course 100A. Analytical treatment of resource use problems, including public policy issues; economic productivity and natural resources; determinants, principles and patterns of natural resource use; resource conservation; land tenure problems and policies.

**\*180. Agricultural Production Economics** (4) II.

Burt  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 106, 155; senior standing. Application of theory and quantitative methods to risk and uncertainty as they relate to production response, investment decisions, enterprise combination, machine scheduling, crop insurance and government programs.

**\*190A. Senior Research Project** (2) II.

Lecture—1 hour; discussion—1 hour. Prerequisite: course 100A; Statistics 103 or consent of instructor; senior standing. Individual student-defined research project conducted under faculty guidance. Problem definition, study objectives, procedure, method of analysis, working outline, and preliminary elements of report writing to be completed in the first quarter. (Deferred grading only, pending completion of sequence.)

**\*190B. Senior Research Project** (2) III.

Lecture—1 hour; discussion—1 hour. Prerequisite: course 190A or consent of instructor. The research report begun in course 190A will be completed and, after evaluation by the instructor, be revised and resubmitted by the student prior to the end of 190B. (Deferred grading only, pending completion of sequence.)

**192. Internship** (1-6) I, II, III, summer. The Staff (Chairperson in charge)

Laboratory—3-18 hours. Internship experience off and on campus in all subject areas offered in the Department of Agricultural Economics. Internships are supervised by a member of the staff. (P/NP grading only.)

**197T. Tutoring in Agricultural Economics** (1-3) I, II, III. The Staff (Chairperson in charge)

Hours and duties will vary depending upon the course being tutored. Prerequisite: senior standing in Agricultural Economics and consent of Department Chairperson.

son. Tutor will lead small discussion groups affiliated with one of the department's regular courses, under the supervision of, and at the option of the instructor in charge of the course. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)  
**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**200A. Microeconomic Theory** (5) II. Caputo

Lecture—4 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 200M. Theories of behavior of individual economic agents. Characteristics of market equilibrium in perfectly competitive, monopolistic, and monopsonistic markets. (Same course as Economics 200A.)

**200B. Microeconomic Theory** (5) III. Helms (Economics)

Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A. Introduction to theorems of welfare economics in a general equilibrium, linear economic models, externalities and market failure, social welfare functions. (Same course as Economics 200B.)

**200C. Microeconomic Theory** (4) III. Makowski (Economics)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200B. Further topics in microeconomics, including risk and uncertainty, capital theory, separability and aggregation, and other topics. (Same course as Economics 200C.)

**200M. Optimization in Economics** (5) I. Roemer (Economics)

Lecture—4 hours; discussion—1 hour. Prerequisite: Economics 100 or 100M and 101, or courses 100A-100B and Economics 101; Mathematics 21A, 21B, and 21C. Mathematics for economists including linear programming, shadow pricing, linear algebra, convexity and concavity, non-linear programming, Kuhn-Tucker conditions. (Same course as Economics 200M.)

**204. Microeconomic Analysis** (5) I. The Staff

Lecture—4 hours; discussion—1 hour. Prerequisite: Economics 100 or courses 100A-100B and Mathematics 16A-16B; open to advanced undergraduates with consent of instructor. Economic reasoning and social choice: behavior of firms and households, theory of markets, partial and general equilibrium analysis, welfare economics, illustrations and applications. (Same course as Economics 204.)

**215A. Economic Development** (4) I. Jarvis

Seminar—3 hours; discussion—1 hour. Prerequisite: bachelor's degree in Economics (or the equivalent) or consent of instructor. Theories of economic development as they relate to developing nations; demographic problems; distribution issues in economic development. (Same course as Economics 215A.)

**215B. Macroeconomic Development** (4) II. Kaneda (Economics)

Seminar—3 hours; discussion—1 hour. Prerequisite: course 215A. The macroeconomics of economic development; monetary policy problems; fiscal problems; international trade; specific country studies. (Same course as Economics 215B.)

**215C. Economic Development in Agriculture: Policy and Planning** (4) II. Taylor

Lecture—3 hours; discussion—1 hour. Prerequisite: course 215A or the equivalent. Agriculture in the structure of developing nations; its role in economic development; agriculture and national planning; sectoral policies relating to prices, inputs, productivity, and marketing; international aspects of trade, aid, and technical assistance; country case studies. (Same course as Economics 215C.)

**215D. Development Programming** (4) III. Kaneda (Economics)

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200B, 215A and 215B. Analysis of development plans, sectoral or regional programs and policies. Application of macroeconomic models, input-output, Social Account Matrix (SAM) and program-

ming techniques. Analysis and case studies of methods of project evaluation. (Same course as Economics 215D.)

**220. Economics of Consumer Policy (3) III.** Hazlett  
Lecture—3 hours. Prerequisite: one graduate course in economic theory and one course in econometrics or the equivalent. Policy criteria; sources of market failure; consumer policy alternatives; empirical evaluation of selected economic policies.

**221. Agricultural Policy in Developed Countries**

(4) I. McCalla  
Lecture-discussion—4 hours. Economic policy, its nature, formation and analysis; characteristics of agricultural sectors in developed countries; comparative analysis of policies relating to production, marketing, price, income, rural poverty, and resource adjustment; international trade policies for temperate zone agricultural commodities.

**\*222. International Agricultural Trade and Policy**

(4) I. Carter  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B or Economics 204; Economics 106 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. Offered in even-numbered years.

**240A. Econometric Methods (4) II.** Burt

Lecture—4 hours. 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.)

**240B. Advanced Econometrics: Theory (4) I.**

Havener  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A; Statistics 131A, 131B, 131C recommended. Multivariate analysis, specification analysis, simultaneous equation models, identification, estimating methods, small sample properties. (Same course as Economics 240B.)

**240C. Advanced Econometrics: Applications (4)**

II. Wegge  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A. Time series analysis and distributed lags, pooling of time series and cross-section data, Bayesian analysis, applications for prediction and policy. (Same course as Economics 240C.)

**240D. Topics in Econometrics (4) III.** Cameron

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Advanced topics in nonlinear econometric modelling. Contents may vary from year to year. (Same course as Economics 240D.)

**252. Applied Linear Programming (4) I.** Howitt

Lecture—3 hours; discussion—1 hour. Applied linear programming methods emphasizing uses for business decisions: production, diet, blending, network and related problems.

**253. Optimization Techniques with Economic Applications (4) II.** Caputo

Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics/Economics 200M. Optimization techniques and methods including linear and nonlinear programming and dynamic models. Numerical applications to household, firm, general equilibrium and economic growth problems.

**254. Dynamic Optimization Techniques for Economic Systems with Applications (4) II.** Howitt

Lecture—4 hours. Prerequisite: course 253. Dynamic programming, Pontryagin maximum principle, and optimal control problem. Emphasis on methods with selected applications to economic problems.

**255. Systems Analysis and Simulation (3) III.**

Logan  
Lecture—3 hours. Dynamic model formulation and computer simulation of economic systems.

**256. Applied Econometrics (4) II.** Green

Lecture—3 hours; discussion—1 hour. Application of statistical tools to economic and business analysis.

Emphasis on regression analysis, problems of specification, and model development.

**257. Production Planning and Market Analysis (3) III.**

Alston  
Lecture—3 hours. Quantitative analysis of production systems by statistical, economic, and engineering methods; sales analysis for the individual firm; problems of investment, location, scale of operations.

**\*258. Applied Consumption Analysis (3) III.**

Lecture—3 hours. Prerequisite: one graduate course in microeconomic theory. Advanced analysis of individual and aggregate consumption models; empirical determinants of consumer behavior; application of consumption economics to selected issues.

**261. Case Problems in Management (3) II.**

McCorkle  
Lecture—1 hour; discussion—2 hours. Case problem analysis and discussion of business policy and strategy including organization, planning, production, marketing, and financing issues. Emphasis is on problem definition and solution using current examples drawn primarily from agriculturally-oriented firms.

**263. Agricultural Firm Analysis (3) III.** McCorkle

Lecture—1 1/2 hours; discussion—1 hour; summer field trips—one 5-day, and one 5-hour. Prerequisite: graduate standing in Agricultural Economics. Review and analysis of production, marketing, and resource issues facing agricultural firms in California. Application of production, economic theory and measurement to individual firm decisions in an applied setting.

**271. Financial Management (3) III.** Sosnick

Lecture—3 hours. Prerequisite: course 171B or the equivalent. Sources and costs of capital; optimal capital structure; project evaluation; investment policy; risk management; dividend policy; management of working capital; mergers and reorganizations.

**276. Institutional and Economic Analysis of Natural Resources (3) II.** Kling

Lecture—2 hours; discussion—1 hour. Prerequisite: course 100A or Economics 100. Natural resources are developed and allocated in a milieu of institutional arrangements that significantly affect their economic yields: definition/enforcement of property rights; information and search costs; market externalities, transactions and adjustment costs. Applications to land/water policy.

**\*280. Analysis of Research in Production Economics (4) I.** Paris

Lecture—3 hours; discussion—1 hour. Current problems and methods of analysis in agricultural production economics research. Emphasizes both firm and industry.

**281. Economic Analysis of Demand and Trade (3)**

I. Sexton  
Lecture—3 hours. Models and methods of analysis of demand, interregional trade, and location in the agricultural economy.

**283. Analysis of Research in Natural Resource Economics (3) III.** Wilen

Lecture—3 hours. Scope and disciplinary context of natural resource economics. Recent problems affecting policy and use planning including efficiency and welfare criteria, technological externalities, public goods, extramarket goods, indivisibilities, and intertemporal problems, benefit cost analysis and public and private investment criteria.

**290. Introduction to Research in Agricultural Economics (1) I.** Johnston

Seminar—1 hour. Prerequisite: graduate standing in Agricultural Economics. Seminar to familiarize entering students with research issues, research applications, research methodology, information sources and problem identification. Focus is on underlying motivations, usefulness and scope of agricultural economics research. (S/U grading only.)

**291. Advanced Research Development (1) I.** H. H. Carter

Seminar—1 hour. Prerequisite: second-year Ph.D. standing. Current research problems and activities; guidance on the selection, design, funding and man-

ageability of projects. (S/U grading only.)

**298. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

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) I, II, III.** The Staff (Chairperson in charge)

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) I, II, III.** The Staff (Chairperson in charge) (S/U grading only.)

## Agricultural Education

**See Agricultural Education; and Agricultural and Home Economics Education**

## Agricultural Education

(College of Agricultural and Environmental Sciences)

### The Major Program

The Agricultural Education major serves those interested in teaching agricultural sciences in high schools or community colleges as well as those preparing for a service-type career in agriculture. It prepares graduates whose function will be to supervise youth and adult groups and to direct programs requiring preparation in both agricultural and human resources. State and federal requirements for instructors participating in federally funded vocational programs are also met. The need for scientists, technicians, and creative educators to assist in domestic and international agricultural 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 industries. Students interested in obtaining breadth in both agricultural and environmental sciences will appreciate the scope and flexibility which this program provides.

### B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

UNITS

**Written/Oral Expression** ..... 11-12

English (English 1 or 3 and 102 or 103) ..... 7-8

(Note: the above courses simultaneously satisfy the College requirement)

Rhetoric (Rhetoric and Communication 1 or 3) ..... 4

**Preparatory Subject Matter** ..... 50-51

Biological sciences (Biological Sciences

1A, 1B, and 1C) .....	15
Chemistry (Chemistry 1A-1B, and 8A-8B or 128A-128B) .....	16
Computer science (Agricultural Science and Management 21) .....	3
Economic principles (Economics 1A or 1B) .....	5
Genetics (Genetics 10 or 100) .....	4
Mathematics (Mathematics 16A or 21A) .....	3-4
Statistics (Agricultural Science and Management 150 or Statistics 13) .....	4
<b>Breadth/General Education</b> .....	<b>6-24</b>
Satisfaction of General Education requirement .....	6-24
<b>Depth Subject Matter</b> .....	<b>44-52</b>
Education (Agricultural and Home Economics Education 100 and 300, or Applied Behavioral Sciences 175; and Education 110) .....	8
Animal science (Animal Science 1 (if no previous course work in Animal Science); Animal Science 2, 21, and 41; one of the following: Animal Science 15, 49A, 49B, or 49C) .....	11-16
Agricultural economics (Agricultural Economics 130 or 140) .....	4-5
Plant science (Plant Science 2; Soil Science 10 or 100; choose one of the following: Environmental Horticulture 10, Vegetable Crops 101, Agronomy 100, Pomology 101, Viticulture and Enology 2 or 116) .....	11-13
Agricultural mechanics (Agricultural Practices 49 and 149; Consumer Technology 15 and 16; one of the following: Agricultural Engineering Technology 15, Civil Engineering 10, or Consumer Technology 101) .....	10
<b>Specialization</b> .....	<b>30-32</b>
(To be developed in consultation with faculty adviser.)	
<b>Unrestricted Electives</b> .....	<b>19-39</b>
<b>Total Units for the Degree</b> .....	<b>180</b>
<b>Major Adviser.</b> J. G. Leising (Applied Behavioral Sciences).	
<b>Advising Center</b> for the major is located in 101 AOB 4 (916-752-2244).	
<b>Teaching Credential Subject Representative.</b> You may make an appointment with a credential counselor and obtain a statement of the complete requirements for the credential at the Applied Behavioral Sciences departmental office, 106 AOB 4. Since many majors in the College do not offer the minimum preparation necessary for entering the Agriculture Credential program, you are encouraged to seek counseling as early as possible. See also the Teacher Education Program.	
<b>Graduate Study.</b> The Department of Applied Behavioral Sciences offers a program of study leading to the M.Ed. degree. Further information may be obtained from the Department and the <i>Graduate Announcement</i> .	
<b>Graduate Adviser.</b> J.G. Leising (Applied Behavioral Sciences).	

## Agricultural Engineering

(College of Agricultural and Environmental Sciences)

Henry E. Studer, M.S., Chairperson of the Department

Department Office, 2030 Bainer Hall (916-752-0102)

### Faculty

Norman B. Akesson, M.S., Professor Emeritus  
William J. Chancellor, Ph.D., Professor  
Pictiaw (Paul) Chen, Ph.D., Professor

Michael J. Delwiche, Ph.D., Associate Professor  
Roger E. Garrett, Ph.D., Professor  
D. Ken Giles, Ph.D., Assistant Professor  
John R. Goss, M.S., Professor Emeritus  
Mark E. Grismer, Ph.D., Associate Professor  
George F. Hanna, M.Ed., Lecturer Emeritus  
Bruce R. Hartsough, Ph.D., Assistant Professor  
S. Milton Henderson, M.S., Sc.D., Professor Emeritus  
David J. Hills, Ph.D., Professor  
Bryan M. Jenkins, Ph.D., Associate Professor  
Robert A. Kepner, B.S., Professor Emeritus  
John M. Krochta, Ph.D., Professor  
Coby Lorenzen, Jr., M.S., Professor Emeritus  
Kathryn McCarthy, Ph.D., Assistant Professor  
Michael J. McCarthy, Ph.D., Assistant Professor  
R. Larry Merson, Ph.D., Professor  
John A. Miles, Ph.D., Professor  
Stanton R. Morrison, Ph.D., Professor Emeritus  
Loren W. Neubauer, Ph.D., Professor Emeritus  
Michael O'Brien, Ph.D., Professor Emeritus  
Raul H. Piedrahita, Ph.D., Assistant Professor  
James W. Rumsey, M.S., Lecturer  
Thomas R. Rumsey, Ph.D., Associate Professor  
R. Paul Singh, Ph.D., Professor  
David C. Slaughter, Ph.D., Assistant Professor  
Henry E. Studer, M.S., Professor  
Shrinivasa K. Upadhyay, Ph.D., Associate Professor  
Wesley W. Wallender, Ph.D., Associate Professor  
Wesley E. Yates, M.S., Professor Emeritus  
**Courses.** Courses are listed under Agricultural Engineering Technology (below), Consumer Technology, and Engineering: Agricultural.

capabilities and operating principles. (P/NP grading only.)

**102AT. Farm Tractors** (1) I, II, III. J. Rumsey  
Autotutorial. Prerequisite: Physics 1A or 5A; course 105 (may be taken concurrently). Types of farm tractors, operating principles, power transmission components, power-take-off drives, implement hitches and controls, traction and drawbar power, operator safety, comfort and convenience. (P/NP grading only.)

**103. Hydraulic Power and Controls** (1) II. Studer  
Lecture-laboratory—2 hours. Prerequisite: upper division standing; Physics 5A. Principles of operation and construction of hydraulic systems. Function and application of pumps, motors, and valves for controlling machines.

**104AT. Field Machinery** (1) I, II, III. J. Rumsey  
Autotutorial. Prerequisite: Physics 1A or 5A; course 105 (may be taken concurrently). Performance, operating characteristics, costs, operating principals, components, use, types and sizes of farm equipment for field and row crops. (P/NP grading only.)

**105. Farm Equipment Management** (1) I, II, III. J. Rumsey

Lecture-discussion—1 hour. Prerequisite: Agricultural Practices 49, or concurrent enrollment in one of the following: course 101AT, 102AT, 104AT, Agricultural Practices 49; or consent of instructor. Farm machinery performance, selection, scheduling and maintenance as affected by technical features, costs and operator abilities, as well as by crop, soil and weather characteristics. Discussions link technical information from accompanying autotutorial or practice courses to management principles.

**110L. Experiments in Food Engineering** (1) II.

Singh  
Laboratory—3 hours. Prerequisite: Food Science and Technology 110B (may be taken concurrently). Use of temperature sensors; measurement of thermal conductivity and heat transfer coefficients; heat exchangers; transient heat transfer in foods; refrigeration, freezing, concentration and dehydration of foods. (P/NP grading only.)

**113. Animal Environment and Shelters** (1) I. Studer  
Lecture—2 hours (first five weeks of quarter). Prerequisite: Animal Science 2 or consent of instructor. Animal energetics; heat and vapor transmission in buildings; psychometrics; ventilation; hot-weather protection. Environmental considerations affecting the choice of animal shelter.

**114. Greenhouse Environment and Equipment** (1) I. Studer  
Lecture—2 hours (last five weeks of quarter). Prerequisite: Plant Science 2 or Biological Sciences 1C. Study of shelters and equipment providing a suitable environment for plant growth; temperature and humidity regulation; energy conservation, lighting.

**134. Pesticide Application Techniques** (1) III. Giles  
Lecture—1 hour. Prerequisite: upper division standing; Chemistry 1B; introductory course in environmental toxicology; Physics 1A or 5A; introductory course in entomology, botany, plant pathology or nematology recommended. Emphasis will be on safe application of pesticides. Requirements of closed mixing and handling systems to protect workers. Disposal of pesticide materials. Selection and operation of ground and aerial spray application systems. Techniques to minimize spray drift hazards.

**141. Technology for Agriculture in Developing Regions** (3) I. Chancellor

Lecture—2 hours; laboratory-discussion—2 hours. Prerequisite: Physics 1A; upper division standing. Equipment used in tropical agriculture, man-, animal-, and engine-powered devices. Energy requirements, size-scale, costs, support infrastructure development, and productivity potentials. (Same course as International Agricultural Development 141.)

**141AT. Equipment Technology for Developing Agriculture** (1) I, II. Chancellor

Autotutorial—1 hour. Prerequisite: course 141 or International Agricultural Development 141 (may be

taken concurrently). Autotutorial (slide-tape) presentation of machinery, irrigation, and marine equipment technology applications, operation, and maintenance. (P/NP grading only.)

**143. Turf and Landscape Irrigation** (2) II. Hills

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. Course emphasis is on hardware associated with sprinkler and drip/trickle systems.

**\*152. Alternative Energy Applications in Agriculture** (2) II. Jenkins, T. Rumsey

Lecture—2 hours. Prerequisite: Chemistry 1B and Physics 5C recommended. Alternate energy technology for: solar radiation; energy production from biomass by anaerobic digestion, fermentation and gasification; utilization of methane, ethanol, and producer gas from these processes. Practical systems for collecting, converting, storing, and using the energy for agricultural purposes.

**161A. Fundamentals of Aquacultural Engineering**

(3) II. Piedrahita

Lecture—3 hours. Prerequisite: Biological Sciences 1A, Mathematics 16B, Chemistry 1B. Basic principles of water chemistry and water treatment processes as they relate to aquacultural systems.

**161B. Fundamentals of Aquacultural Engineering**

(3) III. Piedrahita

Lecture—3 hours. Prerequisite: course 161A. Design of aquacultural systems: design methodology, principles of fluid mechanics, site selection and facility planning, management operations, computer modeling.

**192. Internship in Agricultural Engineering Technology** (1-5) I, II, III. The Staff (Studer in charge)

Work-learn experience—3-15 hours. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work-learn experience in agricultural engineering technology. May be repeated for credit. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Studer in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates**

(1-5) I, II, III. The Staff (Studer in charge)

(P/NP grading only.)

**Graduate Courses**

**233. Agricultural Chemical Application Technology** (3) III. Giles

Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Protection and Pest Management 202A. Principles and theory of safe and efficient application of pesticides by aerial and terrestrial equipment. Theory, design, selection and operation of nozzles, pumps, and spray systems. Selection of application techniques to minimize spray drift. Closed systems for safe mixing and loading of toxic chemicals.

**298. Group Study** (1-5) I, II, III. The Staff (Studer in charge)

**299. Research** (1-12) I, II, III. The Staff (Studer in charge)

(S/U grading only.)

**Professional Course**

**317. Teaching Agricultural Mechanics** (3) II. J. Rumsey

Lecture—1 hour; laboratory—3 hours; term paper. Prerequisite: a course in physics; 6 units related to agricultural mechanics; enrolled in Agricultural Education Teacher Credential Program. Methods of teaching agricultural mechanics in secondary schools. Curriculum planning. Development of lesson plans and teaching aids. Review of subject matter. Safety-planning facilities including selection, arrangement and management of tools, equipment and teaching materials.

## Agricultural Practices

(College of Agricultural and Environmental Sciences)

### Courses in Agricultural Practices

Questions pertaining to the following courses should be directed to the instructor or to the Office of the Department of Agricultural Engineering, 2030 Bainer Hall.

#### Lower Division Course

**49. Field Equipment Operation** (2) I, III. J. Rumsey

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 cultural practices sequences. (P/NP grading only.)

#### Upper Division Course

**149. Field Equipment Maintenance** (2) II. J. Rumsey

Lecture—1 hour; laboratory—3 hours. Prerequisite: Consumer Technology 16 and 101 or consent of instructor. Trouble shooting and major repair of farm equipment. Intermediate welding to include hardfacing and inert gas welding. Class projects on maintenance, repair and fabrication. (P/NP grading only.)

## Agricultural Science and Management

(College of Agricultural and Environmental Sciences)

### The Major Program

The Agricultural Science and Management major is designed to prepare students for career opportunities on farms and ranches, in land management, and in agricultural service industries. The program provides a core of science and technology necessary for the understanding of how agricultural and food systems work, along with basic elements of economics, business, and management. Students may select from among several options allowing concentration of their agricultural science and technology courses in a chosen field. Experience in computing sciences serves as an appropriate complement to this major.

### B.S. Major Requirements:

For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal courses are acceptable; and a more comprehensive course treatment (e.g., Physics 1A and 1B rather than 1A only) will be useful for some. Students should consider using some portion of their unrestricted elective units to go beyond the *minimum* requirements shown for the Preparatory and Depth Subject Matter areas.

#### UNITS

**Written/Oral Expression** ..... 7-8

See College requirement ..... 7-8

**Preparatory Subject Matter** ..... 59

Accounting (Economics 11A, 11B) ..... 8

Biological sciences (Biological Sciences 1A, 1B, 1C) ..... 15

Chemistry (Chemistry 1A, 1B, 8A, 8B) ..... 16

Economic principles (Economics 1A, 1B) ..... 10

Mathematics (Mathematics 16A-16B or the equivalent) ..... 6

Statistics (Agricultural Science and Management 150) ..... 4

**Breadth Subject Matter** ..... 6-24

Satisfaction of General Education requirement ..... 6-24

#### Depth Subject Matter

..... 20-21

Agricultural Economics 100A, 140 ..... 9

Three courses covering three additional topics in economics and business management, such as marketing (Agricultural Economics 113, 130, 136); finance (Agricultural Economics 118A, 118B, 145, 171A, 171B); business methods (Agricultural Economics 155, 157); and business organization (Agricultural Economics 18, 112) ..... 11-12

#### Areas of Specialization

..... 51-58

##### Animal Science option

..... 54

Animal Science 2 (Animal Science 1 recommended) ..... 4

Genetics 100, Animal Genetics 107 ..... 9

Nutrition 115 ..... 4

Physiology 110 ..... 5

Animal Science ..... 20

Restricted electives ..... 12

Courses to support student's objectives chosen with adviser's approval from the following or other areas: agricultural engineering technology; agronomy; plant science; range management; soil science and water science; Plant Science 2 or Agronomy 100; computer science (Agricultural Science and Management 21) recommended.

##### Food Science option

..... 54

Biochemistry 101A, 101B ..... 6

Chemistry 1C, 5 ..... 9

Physics 5A, 5B ..... 8

Food Science and Technology ..... 31

Food Science and Technology 103,

104-104L, 110A, 110B, and 10 additional units in food science and technology chosen with adviser's approval.

##### Plant Science option

..... 56-58

Botany 111, 112; 120 or 121 ..... 9

Entomology 100-100L or 110 ..... 4-5

Genetics 100 ..... 4

Physics 1A, 1B ..... 6

Plant Pathology 120 ..... 4

Plant Science 2 ..... 5

Soil Science 100, 109 ..... 8

Water Science 110 ..... 3

Restricted electives ..... 13-14

Additional courses chosen with adviser's approval from agricultural engineering technology, Agricultural Science and Management 21, and upper division courses with concentration in agronomy, environmental horticulture, plant science, pomology, vegetable crops or viticulture.

##### Range Science option

..... 51

Agricultural Economics 147 ..... 4

Agricultural Science and Management 21 ..... 3

Agronomy 112 ..... 3

Animal Science 2, 41, 41L, 128 ..... 11

Botany 111, 117 ..... 7

Nutrition 115 ..... 4

Range Science 100, 133, 145, 160 ..... 12

Resource Sciences 101 ..... 3

Soil Science 100 ..... 4

##### Unrestricted Electives

..... 10-37

##### Total Units for the Degree

..... 180

##### Major Adviser

R. W. Touchberry (Animal Science).

Upon entering the major, students should contact the Advising Center for assignment of a faculty adviser with expertise in the selected option.

##### Advising Center

for the major is located in 1149 Meyer Hall (916-752-6118); and peer advising is in 1139 Meyer Hall.

##### Graduate Study

Refer to the Graduate Division section in this catalog.

## Courses in Agricultural Science and Management

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 137 Hunt Hall.

### Lower Division Course

**21. Applications of Microcomputers for Agriculture** (3) I. Plant (Agronomy and Range Science); II. Menke (Agronomy and Range Science); III. Williams (Agronomy and Range Science)  
Lecture—2 hours; laboratory—2 hours. Prerequisite: high school algebra. Concepts of computing in an agricultural context; applications of microcomputers using BASIC, spreadsheets, database management, word processing and communications.

### Upper Division Courses

**121. Analysis and Simulation of Agricultural Systems** (4) I. Plant

Lecture—3 hours; discussion-laboratory—1 hour. Prerequisite: course 21 or the equivalent experience with computers. The process of systems analysis, dynamic simulation of crops and biological populations, constructions and use of simulation models for agricultural systems, and an introduction to expert systems and their applications in agriculture.

**150. Applied Statistics in Agricultural Sciences**

(4) I. Geng (Agronomy and Range Science)  
Lecture—3 hours; discussion-laboratory—2 hours. Applications of statistical methods to the analysis and interpretation of research data in plant, animal, behavioral, food and nutritional sciences. Lectures cover basic concepts and statistical methods. Specialized laboratory sections cover procedures, data processing and interpretations.

## Agronomy

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of Agronomy and Range Science.

**Major Program.** See the major in Plant Science or Range and Wildlands Science.

**Graduate Study.** A program of study is offered leading to the M.S. degree in Agronomy. Information can be obtained in the Advising Office at 137 Hunt Hall. Also see the Graduate Division section in this catalog.

**Graduate Adviser.** R.L. Travis.

**Related Courses.** See Plant Science and Range Science.

### Courses in Agronomy

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 137 Hunt Hall.

### Lower Division Courses

**92. Agronomy Internship** (1-12) I, II, III, summer. The Staff (Department Chairperson in charge)  
Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-learn experience on or off campus in all subject areas pertaining to agronomy. Internships supervised by a member of the faculty. (P/NP grading only.)

### Upper Division Courses

**100. Principles of Agronomy** (4) III. Travis  
Lecture—3 hours; discussion-demonstration—1 hour. Prerequisite: a course in general botany and/or Plant Science 2 or consent of instructor. Fundamentals of field crop production and agronomic problem solving using ecological, physiological, and genetic principles.

**100L. Principles of Agronomy Laboratory** (1) III. Travis  
Laboratory—3 hours. Prerequisite: course 100 (may

be taken concurrently.) Field-oriented introduction to principles of agronomic crop production.

**110. Perspectives in Biotechnology** (3) II. Valentine  
Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 10 or Genetics 10. Current issues in biotechnology will be related to their impact on the biological sciences and society. Examples of genetic manipulation through transformation and transfer in agriculture and medicine will be stressed.

**111. Cereal Crops of the World** (4) III. Qualset  
Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100, 100L; Biological Sciences 1C. Contribution of cereal crops to man's development; adaptation, production, utilization, and factors determining quality of wheat, oats, barley, rice, corn, and sorghum. Emphasis is on recent developments and scientific improvements.

**112. Forage Crop Ecology** (3) III. Raguse  
Lecture—3 hours. Prerequisite: Biological Sciences 1C 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. Offered in odd-numbered years.

**113. Fiber, Oil and Sugar Crops in a Changing World** (4) I. Rains

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 100, 100L; Biological Sciences 1C. Industrial crops as world resources of food, feed, fiber, and consumer goods. The relationship of crops to their physical and biotic environment; technological changes, socioeconomic and political forces that shape crop production, and utilization practices. Offered in odd-numbered years.

**120. Morphology and Reproduction of Agronomic Crops** (3) III. Webster

Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1C or the equivalent. Study of growth and development of crop plants with emphasis on reproductive structure and pollination. Techniques for morphological analysis of crop plant growth. Offered in odd-numbered years.

**192. Internship** (1-12) I, II, III, summer. The Staff (Department Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learn experience on or off campus in all subject areas pertaining to agronomy. Internships supervised by a member of the faculty. (P/NP grading only.)

**197T. Tutoring in Agronomy** (1-5) I, II, III. The Staff (Chairperson in charge)

Tutoring—1-5 hours. Prerequisite: course to be tutored or the equivalent; upper division standing and consent of instructor. Designed for undergraduate students who desire teaching experience. Student will assist in courses under the direction of the faculty. May be repeated for credit up to a total of 5 units. Same course may not be tutored more than one time. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates**

(1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: 6 upper division units of agronomy. (P/NP grading only.)

### Graduate Courses

**205A. Design, Analysis and Interpretation** (3) II. Plant

Lecture—3 hours. Prerequisite: Agricultural Science and Management 150. Planning and analysis of field and laboratory experiments with emphasis on concept and technique of designing experiments. Randomized block, factorial, incomplete block and response surface designs discussed together with appropriate methods of data analysis and interpretation.

**205B. Design, Analysis and Interpretation**

III. Williams

Lecture—3 hours. Prerequisite: Agricultural Science and Management 150 or the equivalent; Agricultural Science and Management 21 recommended. Planning and analysis of field and laboratory experiments with emphasis on use of multiple regression, multivariate analysis, and dynamic simulation techniques in the biological interpretation of results.

**207. Plant Population Biology** (3) II. Rice, Jain

Lecture—2 hours; laboratory—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Studies 100, Zoology 125, Botany 117, or Entomology 104); an advanced undergraduate course in genetics and/or evolution (e.g., Genetics 100, 103, or Botany 100). Provides entry-level graduate students and advanced undergraduates with an introduction to both theoretical and empirical research in plant population biology. Emphasis will be placed on linking ecological and genetic approaches to plant population biology. Offered in odd-numbered years. (Same course as Ecology 207.)

**221. Advanced Plant Breeding** (4) III. Teuber

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 205A; Genetics 105; Plant Science 113. 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. Laboratories include tours of breeding facilities and calculation and interpretation of quantitative data.

**222. Quantitative Genetics and Plant Improvement** (4) II. The Staff

Lecture—4 hours. Prerequisite: Plant Science 113; Genetics 105; or consent of instructor. Genetic forces affecting populations. Formulation of breeding plans based on principles of population and quantitative genetics. Offered in even-numbered years.

**\*223. Selection Theory in Plant Breeding** (3) II. The Staff

Lecture—2 hours; discussion—1 hour. Prerequisite: course 222 or consent of instructors. Theory and application of selection to plant populations for improvement of quantitative characters. Statistical genetic analysis of quantitative character expression and methods for obtaining maximum efficiency in plant breeding schemes. Offered in odd-numbered years.

**224. Chromosome Evolution** (3) I. Dvorak

Lecture—3 hours. Prerequisite: Genetics 100 or the equivalent. Structure and function of chromosomes. Dynamics of their evolution at the molecular and structural levels. Offered in odd-numbered years.

**232. Advanced Topics in the Physiology of Crop and Range Plants** (3) III. Huffaker

Lecture—3 hours. Prerequisite: Botany 112 or Plant Science 102. Physiological aspects of vegetative and reproductive growth of field crop and range plants in relation to nitrogen utilization and photosynthesis.

**233. Biological Nitrogen Fixation** (3) II. Phillips

Lecture—2 hours; seminar—1 hour. Relationships between fundamental and applied nitrogen-fixation research in biochemistry, genetics, physiology, microbiology, and ecology with overall emphasis on increasing agronomic productivity. Offered odd-numbered years.

**234. Physiology of Crop Growth and Development** (3) I. Jernstedt

Lecture—3 hours. Prerequisite: Botany 111, 112 or the equivalent. Selected aspects of plant growth and development as they relate to crop productivity. Analysis of current literature on shoot and root growth and function, reproduction, senescence, hormonal and environmental controls of development. Offered in odd-numbered years.

**290. Seminar in Crop Growth, Production and Utilization** (1-2) I. Hill; II. Loomis

Seminar—1-2 hours. Topics of current interest related to plant growth processes, production and management systems, and utilization of cultivated food,

feed and fiber crops.

**291. Seminar in Plant Breeding and Evolution of Cultivated Plants** (1-2) I. Valentine

Seminar—1-2 hours. Topics of current interest related to plant breeding systems and the origins and evolution of cultivated plants.

**297T. Tutoring in Agronomy** (1-5) I, II, III. The Staff (Chairperson in charge)

Tutoring—1-5 hours. Prerequisite: graduate standing; consent of instructor; and 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 5 units. Same course may not be tutored more than one time. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge).

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

## Agronomy and Range Science

(College of Agricultural and Environmental Sciences)

Donald R. Nielsen, Ph.D., Chairperson of the Department

Department Office, 133 Hunt Hall (916-752-1703)

### Faculty

Robert W. Ailard, Ph.D., Professor Emeritus (*Agronomy and Range Science, Genetics*)

R. William Breidenbach, Ph.D., Lecturer

Ivan W. Buddenhagen, Ph.D., Professor

Kenneth G. Cassman, Ph.D., Assistant Professor

Beecher Crampton, M.S., Professor Emeritus

Montague W. Demment, Ph.D., Associate Professor

Jan Dvorak, Ph.D., Professor

Shu Geng, Ph.D., Professor

Melvin R. George, Ph.D., Lecturer

Paul L. Gepts, Ph.D., Assistant Professor

James E. Hill, Ph.D., Lecturer

Ray C. Huffaker, Ph.D., Professor

Leland F. Jackson, Ph.D., Lecturer

Subodh K. Jain, Ph.D., Professor

Judith A. Jernstedt, Ph.D., Assistant Professor

Milton B. Jones, Ph.D., Lecturer

Thomas A. Kerby, Ph.D., Lecturer

Horton M. Laude, Ph.D., Professor Emeritus

William M. Longhurst, Ph.D., Professor Emeritus

Robert S. Loomis, Ph.D., Professor

R. Merton Love, Ph.D., Professor Emeritus

John W. Menke, Ph.D., Professor

Duane S. Mikkelsen, Ph.D., Professor Emeritus

Donald R. Nielsen, Ph.D., Professor (*Land, Air, and Water Resources*)

Maurice L. Peterson, Ph.D., Professor Emeritus

Donald A. Phillips, Ph.D., Professor

Richard E. Plant, Ph.D., Professor

Y. P. Puri, Ph.D., Lecturer

Calvin O. Qualset, Ph.D., Professor

Charles A. Raguse, Ph.D., Professor

D. William Rains, Ph.D., Professor

Kevin J. Rice, Ph.D., Assistant Professor

Charles W. Schaller, Ph.D., Professor Emeritus

Steven R. Temple, Ph.D., Lecturer

Larry R. Teuber, Ph.D., Associate Professor

Robert L. Travis, Ph.D., Professor

Raymond C. Valentine, Ph.D., Professor

Barbara D. Webster, Ph.D., Professor

Thea A. Wilkins, Ph.D., Assistant Professor

William A. Williams, Ph.D., Professor

Frederick P. Zscheile, Jr., Ph.D., Professor Emeritus

**Courses.** See the Agronomy, and the Range Science course listings.

## American Studies

(College of Letters and Science)

David Scofield Wilson, Ph.D., Program Director  
Program Office, 816 Sproul Hall (916-752-3377)

### Committee in Charge

Vincent A. Crockenberg, Ph.D., (*Education*)  
Lyn Lofland, Ph.D. (*Sociology*)  
Jay Mechling, Ph.D. (*American Studies*)  
Michael Smith, Ph.D. (*History*)  
Patricia Turner, Ph.D. (*Afro-American Studies, American Studies*)

David Van Leer, Ph.D., (*English*)  
Clarence E. Walker, Ph.D. (*History*)  
Deborah Weiner, Ph.D. (*Art History*)  
David Scofield Wilson, Ph.D. (*American Studies*)

### Faculty

Jay Mechling, Ph.D., Professor  
Patricia Turner, Ph.D., Assistant Professor  
David Scofield Wilson, Ph.D., Associate Professor

### The Major Program

American Studies offers students who feel too limited by departmental approaches to American experience an alternative, interdisciplinary path of study. The program introduces lower division students to the manner in which selected cultural systems shape and reflect American experience. American Studies courses also pay attention to the ways in which differences of class, race, gender, generation, ethnicity, religion, and sexual preference unevenly affect Americans' lives.

American Studies majors receive advanced instruction and practice in viewing American experience through the close study of major interpretive works and through intensive study of American popular culture, of American folklore and folklife, of the arts and ideas of a representative decade in American civilization, and of selected interdisciplinary topics in American culture. Small-group discussions of key works in culture studies prepare students for integrating other course work of the major, and in some cases for undertaking individualized projects in their senior year. Advanced work in at least two other departments or programs allows each student to emphasize a period, a problem, or a subject that is tailored to his or her individual education goals. 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 the student's contact with a variety of subject matter and approaches. This flexibility has meant that graduates have been able to move into a broad range of career settings, including journalism, law, medicine, nursing, law enforcement, environmental planning, teaching, library science, museum curatorship, and business. Some students discover new career possibilities through their internships in American institutions.

### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b>	24
One course from American Studies 1 series	4
American Studies 45	4
Two courses chosen from History 17A, 17B, 72A, 72B	8
One course chosen from English 30A, 30B	4
One course chosen from Anthropology 2, Sociology 2	4
<b>Depth Subject Matter</b>	46
American Studies core courses	12
American Studies 110, 120, and 130	
American Cultural Themes	8
Choose any two courses from the 150	

series

Three Junior Proseminars.....6

(American Studies 180)

Emphasis.....20

In consultation with an American Studies adviser, the student designs a program of 20 units of upper division course work around a unifying theme, period, or subject matter in American civilization. The course work should come from at least two disciplines. The student may choose the **senior thesis option** (190A-190B) for 8 of these 20 units.

**Total Units for the Major** .....70

### Recommended

Completion of the College requirement in English composition before enrollment in American Studies 190A.

### Minor Program Requirements:

UNITS

**American Studies** .....20

American Studies, upper division courses 20  
No more than 8 units of course 192 may be counted toward this total.

**Faculty Advisers.** J. Mechling, D. S. Wilson.

**Teaching Credential Subject Representative.** J. Mechling. See also the Teacher Education Program.

### Courses in American Studies

#### Lower Division Courses

##### 1A. Technology, Science, and American Culture

(4) I. Mechling

Lecture—3 hours; discussion—1 hour. American science and technology as cultural systems, mutual influence and interaction of those systems with other cultural systems, including religion, social thought, art, architecture, literature, music, and common sense. General Education credit: Contemporary Societies/Introductory.

##### 1B. Religion in American Lives (4) II. Wilson

Lecture—2 hours; discussion—1 hour; tutorials and field exercises. Examines ways Americans have ordered their lives with religion; how latter-day churches, imported faiths, and Indian cultures differ or converge; attention to "civil religion" and mass-media evangelism; genres of religious experience, such as testimony, song, dance, ritual, meditation, vision, trance. General Education credit: Civilization and Culture/Introductory.

##### 1C. American Lives through Autobiography (4) III. Turner

Lecture—2 hours; discussion—2 hours. 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.

##### \*1E. Nature and Culture in America (4) I. Wilson

Lecture—3 hours; fieldwork—3 hours. 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 even-numbered years.

##### \*1F. The Popular Image of Women in America (4) I. The Staff

Lecture—2 hours; discussion—1 hour; directed analysis of popular media. Lecture; media exposure; special projects. Examines the image of women as presented in popular media. Emphasis on the politics of gender roles and the connection between the popular feminine image and the demands of the larger American culture.

##### 2. Forms of American Wisdom (2) II, III. Wilson, Mechling

Lecture—1 hour; discussion—1 hour. Exploration of the forms wisdom takes in America: folk knowledge, popular belief, prophetic wisdom, public religion,

common sense, science, literature; special attention to the grounding of wisdom in circumstance of race, gender, generation, ethnic identity, and region. (P/NP grading only.)

**\*10. American Civilization** (4) I. Mechling, Wilson  
Lecture—2 hours; discussion—2 hours. Intended for student not specializing in American Studies. Interpretation of American society and culture from a variety of perspectives. Examples from American landscape, building, ritual, folklore, literature, and art.

**45. Introduction to American Studies** (4) I, III. Wilson, Mechling, and staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: a course from the course 1 sequence, or Anthropology 2, or Sociology 2. Introduction to interdisciplinary approaches to American civilization; close reading of representative American Studies texts from 1930s to present; special attention to the ways American Studies scholars have dealt with gender, social class, race, ethnicity, region, and age. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2 or Sociology 2.

**98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in Charge)  
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**99. Individual Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

### Upper Division Courses

**101A-H. Special Topics** (4) I, II, III. The Staff (Chairperson in charge)  
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. Content will vary according to the instructor and in accord with the following titles: **(A)** Popular Culture Studies; **(B)** Women's Studies; **(C)** Material Aspects of American Culture; **(D)** American National Character; **(E)** American Lives Through Autobiography; **(F)** The Interrelationship Between Arts and Ideas; **(G)** New Directions in American Culture Studies; **(H)** Problems in Cross-Cultural American Studies. May be repeated for credit in different subject area only.

**110. A Decade in American Civilization** (4) II. The Staff

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.

**120. American Folklore and Folklife** (4) III. The Staff

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. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Sociology 2.

**125. Corporate Cultures** (4) III. Hagerty

Lecture—2 hours; discussion—1 hour; fieldwork—1 hour. Prerequisite: one course chosen from course 30, 120, Anthropology 2, Psychology 16, or Sociology 1; or 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.

**130. American Popular Culture** (4) I. The Staff

Lecture-discussion—3 hours; fieldwork and written reports. Prerequisite: course 1F or 45 or consent of instructor. 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. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: American Studies 45, Anthropology 2, or Sociology 2.

**151. American Landscapes and Places** (4) III. Wilson  
Lecture—2 hours; discussion—1 hour; fieldwork—3 hours. Prerequisite: course 1 or 45. 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.

**152. The Lives of Children in America** (4) II. Mechling  
Lecture—2 hours; discussion—2 hours. Experience of childhood and adolescence in American culture, as understood through historical, literary, artistic, and social scientific approaches.

**153. The Individual and Community in America** (4) III. The Staff  
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.

**180. Junior Proseminar** (2) II, III. Mechling, Wilson  
Discussion—2 hours. Prerequisite: junior standing in American Studies major. A small-group, intensive study of works frequently cited in American Studies scholarship; emphasis on theory and its application to American materials. May be repeated for credit with consent of instructor.

**190A-190B. Senior Thesis** (4-4) I, II, III. Mechling, Wilson  
Seminar—2 hours; independent study—2 hours. Prerequisite: senior standing in American Studies major. In consultation with adviser, student contracts to write extended research paper on a topic mutually agreed upon and enunciated in a prospectus reviewed and accepted by faculty. (Deferred grading only, pending completion of sequence.)

**192. Internship in American Institutions** (1-12) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: enrollment dependent on availability of intern positions, with priority to American Studies majors and those completing course 30. 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) I, II, III.

The Staff (Chairperson in charge)  
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) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor and Chairperson of American Studies Program. (P/NP grading only.)

### Graduate Courses

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (S/U grading only.)

**299. Individual Study** (1-12) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (S/U grading only.)

## Anatomy

**See Anatomy (below); Human Anatomy (Medicine, School of)**

## Anatomy

(School of Veterinary Medicine)

Dallas M. Hyde, Ph.D., Chairperson of the Department

Department Office, 1321 Haring Hall (916-752-1174)

### Faculty

George H. Cardinet III, D.V.M., Ph.D., Professor

Leslie J. Faulkin, Jr., Ph.D., Professor

Dallas M. Hyde, Ph.D., Professor

Ralph L. Kitchell, D.V.M., Ph.D., Professor Emeritus

Kent Pinkerton, Ph.D., Assistant Adjunct Professor

Charles G. Plopper, Ph.D., Professor

Judith A. St. George, Ph.D., Assistant Adjunct Professor

Professor

Susan M. Stover, D.V.M., Ph.D., Assistant Professor

Fern Tablin, V.M.D., Ph.D., Assistant Professor

William Thurbeck, M.D., Adjunct Professor

Walter S. Tyler, D.V.M., Ph.D., Professor

Reen Wu, Ph.D., Associate Adjunct Professor

### Courses in Anatomy

#### Upper Division Courses

**100. Comparative Organology of Vertebrates** (4) II. Plopper  
Lecture—3 hours; laboratory—1 hour. Prerequisite: Biological Sciences 1B. Integrative study of the organization of cells and tissues into organs and organ systems in vertebrates. The following organ systems will be compared between fish, birds, and mammals: musculoskeletal, gastrointestinal, cardiovascular, respiratory, integumentary, urinary, reproductive, and nervous.

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

**201A. Advanced Anatomy of the Forelimb** (3) I. Hyde

Lecture—12 hours total; discussion—6 two-hour sessions; laboratory—12 three-hour sessions. Prerequisite: graduate standing and consent of instructor; course 100. Gross and microscopic anatomy of the forelimb of the dog and horse. Emphasis on structural basis of function, unique aspects of each species, and on preparing graduate students for teaching.

**201B. Advanced Anatomy of the Head** (1.5) II. Hyde

Lecture—5 hours total; discussion—4 two-hour sessions; laboratory—6 three-hour sessions. Prerequisite: graduate standing and consent of instructor; course 100. Detailed dissection of the head of the dog with comparison to the horse. Emphasis on structural basis of function, unique aspects of each species, and on preparing graduate students for teaching.

**201C. Advanced Anatomy of the Hindlimb** (2) II. Hyde

Lecture—5 hours total; discussion—5 two-hour sessions; laboratory—10 three-hour sessions. Prerequisite: graduate standing and consent of instructor; course 100. Detailed dissection comparing the hindlimb of the dog and the horse. Emphasis on

structural basis of function, unique aspects of each species, and on preparing graduate students for teaching.

**201D. Advanced Anatomy of the Thorax** (1.5) III.

Popper

Lecture—4 hours total; discussion—5 two-hour sessions; laboratory—6 three-hour sessions. Prerequisite: graduate standing and consent of instructor; course 100. Gross and microscopic anatomy of the thorax and its contents of the dog and other domestic species. Emphasis on structural basis of function, unique aspects of each species, and on preparing graduate students for teaching.

**201E. Advanced Anatomy of the Abdomen** (2) III.

Tyler

Lecture—6 hours total; discussion—7 two-hour sessions; laboratory—7 three-hour sessions. Prerequisite: graduate standing and consent of instructor; course 100. Gross and microscopic anatomy of the contents of the abdomen comparing the dog to other domesticated species. Emphasis on structural basis of function, unique aspects of each species, and on preparing graduate students for teaching.

**201F. Advanced Anatomy of the Pelvis** (3) II-III.

Faulkin

Lecture—10 hours total; discussion—11 two-hour sessions; laboratory—9 three-hour sessions. Prerequisite: graduate standing and consent of instructor; course 100. Gross and microscopic anatomy of the contents of the pelvis of the dog with comparison to other domesticated species. Emphasis on structural basis of function, unique aspects of each species, and on preparing graduate students for teaching. (Deferred grading only, pending completion of two-quarter sequence.)

**202. Organology** (2) II. The Staff (Chairperson in charge)

Lecture—2 hours. Prerequisite: course 100 or the equivalent and consent of instructor. Comparative development, growth patterns, and composition of selected organs: liver, kidney, lung, mammary gland, brain, and a skeletal muscle. Offered in even-numbered years.

**205. Ultramicroscopic Anatomy** (3) I. The Staff (Tyler in charge)

Lecture—3 hours. Prerequisite: histology. The electron microscopic appearance of cells, tissues, and organs of animals emphasizing the structural basis for their physiological functions. Offered in even-numbered years.

**207. Perspectives in Morphological Research** (3)

III. The Staff (Wu, Tablin in charge)

Lecture—2 hours; discussion—1 hour. Consideration of the principles and applications of modern morphological methods and their role in biomedical research. Examples of specific methods include stereology, computer analysis of images, scanning and transmission electron microscopy, histochemistry, autoradiography, rapid freezing, and vascular injections. Offered in odd-numbered years.

**215. Veterinary Histology** (6) II. The Staff (Faulkin in charge)

Lecture—3 hours; laboratory—9 hours. Prerequisite: Biological Sciences 1B. The microscopic anatomy of tissues and organs of mammalian and avian species of veterinary significance.

**221. Neurosciences of Domestic Animals** (5) II.

The Staff

Lecture—33 hours total; discussion—8 two-hour sessions; laboratory—9 three-hour sessions. Prerequisite: graduate standing and consent of instructor. Integrated study of the central nervous system including gross and microscopic anatomy, neurophysiology and neurological examination of domestic animals.

**283. Tumor Biology** (3) I. The Staff (Faulkin in charge)

Lecture—3 hours. Prerequisite: graduate standing and consent of instructor. Growth, invasion and metastasis of tumors; mechanisms of carcinogenesis; intrinsic and extrinsic etiologic factors. Offered in odd-numbered years.

**290. Seminar** (1) I. The Staff  
Seminar—1 hour. (S/U grading only.)

**291. Topics in Biology of Respiratory System** (1) I, II, III. Tyler, Hyde, Popper, St. George, Wu, Pinkerton Seminar—1 hour. Prerequisite: graduate standing and 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.)

**297. Advanced Group Study in Surgical Anatomy** (2-4) I, II, III. The Staff (Chairperson in charge)

Laboratory—6-12 hours. Prerequisite: Veterinary Medicine 407C or consent of instructor. Selected topics in topographical, radiological, or regional anatomy as they apply to the clinical sciences.

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Laboratory—6-15 hours. Prerequisite: consent of instructor.

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

Laboratory—6-36 hours. Prerequisite: consent of instructor. (S/U grading only.)

equivalent

Students are encouraged to engage in some form of research as early as possible during the first year. This pre-dissertation research may be pursued under the guidance of any faculty member of the Group, not necessarily the student's major professor.

**Breadth Requirement.** The following core courses or the equivalent (22 to 24 units) are required of all students.

Systemic physiology: Physiology 110 or Zoology 142  
Statistical analysis: one course from Psychology 206,

207, Statistics 106, or 110

Scientific approaches to animal behavior research:  
Animal Behavior 201

Seminar in animal behavior: Animal Behavior 290  
Ecology: Entomology 104, Environmental Studies

100, or Zoology 125

College teaching: Biological Sciences 310 or Psychology 390

Comparative psychology: Psychology 250

**Specialization.** In addition to the requirements listed above, students must also take courses in one of the three areas of specialization with substitution as approved by the adviser.

## Courses in Animal Behavior

### Graduate Courses

**201. Scientific Approaches to Animal Behavior**

**Research** (3) I. Lott (Wildlife and Fisheries Biology)  
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.

**\*220. Behavioral Aspects of Animal Domestication**

**(3) III. Price (Animal Science)**  
Lecture—3 hours. Prerequisite: graduate standing and a course in animal behavior, or consent of instructor. History of animal domestication, the role of natural and artificial selection in domestication, the influence of environment and experience on domestic animal behavior and human-animal interrelations. Offered in even-numbered years.

**290. Seminar in Animal Behavior** (1-3) III. Owings (Psychology)

Seminar—1-3 hours. Prerequisite: consent of instructor. Selected topics in animal behavior. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff

Prerequisite: graduate standing and consent of instructor.

**299. Research** (1-12) I, II, III. The Staff

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

## Anesthesiology

### See Medicine, School of

## Animal Behavior (A Graduate Group)

Benjamin L. Hart, D.V.M., Ph.D., Chairperson of the Group

Group Office, 148 Young Hall (Psychology)  
(916-752-1880/1855)

**Faculty.** The Group includes faculty from eleven departments in three schools and colleges.

**Graduate Study.** The Ph.D. program in Animal Behavior is an interdepartmental program which trains students for teaching and research in a variety of areas including psychology, zoology, animal science, veterinary science, ecology, and wildlife biology. Students choose one of the three areas of specialization: (1) ethology and evolutionary bases of animal behavior, (2) physiological basis of animal behavior, and (3) behavior of domestic animals. All three specializations emphasize the adaptive and evolutionary bases of animal behavior. Resources available to students, in addition to various departmental facilities, include those of the California Primate Research Center and the Agricultural Field Stations.

There is an early application deadline of February 15 for fall quarter.

**Preparation.** Appropriate preparation is a bachelor's or master's degree in one of the several disciplines relevant to behavior such as psychology, zoology, entomology, anthropology, physiology, wildlife biology, ecology, animal science, veterinary science, genetics, or animal behavior. In addition, at least one course from each of the following four areas must be taken before admission into the program or before the end of the first year in the program.

General genetics: Genetics 100 or the equivalent  
Statistics: Statistics 102 or Psychology 103, or the equivalent

Evolution: Genetics 103 or Zoology 148, or the equivalent

Animal behavior: Psychology 150, Wildlife and Fisheries Biology 140, or Zoology 155, or the

## Animal Biochemistry

### See Biochemistry; and Biochemistry and Biophysics

## Animal Genetics

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of Animal Science.

**Major Program.** See the major in Genetics.

**Related Courses.** See Agronomy 221, 222, 223; Plant Pathology 215; Plant Science 113; Vegetable Crops 220.

### Courses in Animal Genetics

Questions pertaining to the following courses should be directed to the instructor or to the Animal Science Advising Center, 1149 Meyer Hall.

**Upper Division Courses**

**107. Genetics and Animal Breeding** (5) I, III. Gall, Medrano  
Lecture—4 hours; laboratory—3 hours. Prerequisite: Genetics 100. 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.

**108. Methods in Quantitative Animal Breeding** (3) II. Famula  
Lecture—3 hours. Prerequisite: course 107. Methods and procedures in quantitative animal breeding, including: expected value, single and multiple trait selection index, restricted selection, embedded traits, categorical traits, and best linear unbiased prediction.

**109. Introduction to Parameter Estimation** (1) II. Famula  
Lecture—1 hour. Prerequisite: course 107 or the equivalent; course 108 recommended. Procedures for estimation of repeatability, heritability, and genetic and environmental correlations. Concept of expected value, estimation of variance components and the simulation of biological data.

**198. Directed Group Study** (1-5) I, II, III. The Staff (Bradford in charge)  
Prerequisite: consent of instructor. Selected topics relating to animal genetics. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Bradford in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**204. Theory of Quantitative Genetics** (3) I. Gall  
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. Offered in odd-numbered years.

**206. Advanced Domestic Animal Breeding** (3) I. Famula  
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 odd-numbered years.

**207. Quantitative Genetics and Animal Breeding Theory** (3) II. Abplanalp (Avian Sciences)

Lecture—2 hours; laboratory—2 hours. Prerequisite: Statistics 106 and 108 or 130A and 130B. Quantitative genetic theory, relating to inbreeding and cross-breeding systems, selection for cross performance, major quantitative genes, control populations, is developed and applied to the planning of breeding programs. Offered in even-numbered years.

**208. Estimation of Genetic Parameters** (3) III. Touchberry (Animal Science)

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.

**250. Animal Improvement in an International Context** (4) III. Bradford  
Lecture—3 hours; seminar—1 hour. Prerequisite: completion of at least one year of graduate study, including upper division or graduate courses in livestock production and animal breeding. Evaluation, utilization, conservation and exchange of animal germ plasm resources; exploitation of heterosis; improvement schemes in the absence of central data processing; population structure and rate of improvement; roles of governments; group breeding schemes; research needs. (S/U grading only.) Offered in odd-numbered years.

**298. Group Study** (1-5) I, II, III. The Staff (Bradford in charge)

Prerequisite: consent of instructor. Lectures and discussions of advanced topics in animal genetics. (S/U grading only.)

**299. Research in Animal Genetics** (1-12) I, II, III. The Staff (Bradford in charge)  
(S/U grading only.)

Edward J. DePeters, Ph.D., Associate Professor

Serge Doroshov, Ph.D., Professor

James G. Fadel, Ph.D., Assistant Professor

Thomas R. Famula, Ph.D., Associate Professor

Graham A. E. Gall, Ph.D., Professor

William N. Garrett, Ph.D., Professor

Dennis Hedgecock, Ph.D., Lecturer

Hubert Heitman, Jr., Ph.D., Professor Emeritus

J.L. Hull, M.S., Lecturer

Silas S. O. Hung, Ph.D., Associate Professor

Robert C. Laben, Ph.D., Professor Emeritus

Yu-Bang Lee, Ph.D., Professor

Glen P. Lofgreen, Ph.D., Professor Emeritus

Joan M. Macy, Ph.D., Associate Professor

Juan F. Medrano, Ph.D., Assistant Professor

Verne E. Mendel, Ph.D., Professor (*Animal Science, Animal Physiology*)

James H. Meyer, Ph.D., Professor Emeritus, Chancellor Emeritus

Gary P. Moberg, Ph.D., Professor

James D. Murray, Ph.D., Associate Professor

Anita M. Oberbauer, Ph.D., Assistant Professor

Edward O. Price, Ph.D., Professor

Wade C. Rollins, Ph.D., Professor Emeritus

Janet F. Roser, Ph.D., Assistant Professor

Robert W. Touchberry, Ph.D., Professor

William C. Weir, Ph.D., Professor Emeritus (*Animal Science, Nutrition*)

Richard A. Zinn, Ph.D., Associate Professor

## Animal Nutrition

### See Nutrition

## Animal Physiology

(College of Agricultural and Environmental Sciences)

Verne E. Mendel, Ph.D., Chairperson of the Department

Department Office, 196 Briggs Hall (916-752-0203)

### Faculty

Marylyn S. Barkley, Ph.D., Associate Professor

James M. Boda, Ph.D., Professor Emeritus

Earl E. Carstens, Ph.D., Associate Professor

Harry W. Colvin, Jr., Ph.D., Professor Emeritus

Perry T. Cupps, Ph.D., Professor Emeritus (*Animal Science*)

Charles A. Fuller, Ph.D., Associate Professor

Jack M. Goldberg, Ph.D., Associate Professor

John M. Horowitz, Jr., Ph.D., Professor

Barbara A. Horwitz, Ph.D., Professor

Andrew T. Ishida, Ph.D., Assistant Professor

Frederick W. Lorenz, Ph.D., Professor Emeritus

Verne E. Mendel, Ph.D., Professor (*Animal Physiology, Animal Science*)

Gary P. Moberg, Ph.D., Professor (*Animal Science*)

Frank X. Ogasawara, Ph.D., Professor Emeritus (*Avian Sciences*)

Pamela A. Papone, Ph.D., Associate Professor

Edward A. Rhode, Ph.D., Professor

Grace L. Rosenquist, Ph.D., Assistant Adjunct Professor

Robert P. Scobey, Ph.D., Professor (*Neurology*)

Arnold J. Sillman, Ph.D., Professor

Arthur H. Smith, Ph.D., Professor Emeritus

W. Jeffrey Weidner, Ph.D., Professor

Charles M. Winget, Ph.D., Lecturer

Dorothy E. Woolley, Ph.D., Professor

**Courses.** See the course listings under Physiology (Animal).

## The Major Program

The objective of the Animal Science major is to develop an understanding of the proper care of animals and their utilization by man for food, fiber, work, research, companionship, and recreation. The study of animals is achieved through biological, physical, and social sciences such as chemistry, biochemistry, genetics, physiology, nutrition, economics, mathematics, and their integration in the various animal science courses.

Career opportunities for graduates cover a wide range from farming and ranching through all of the industries, institutions, and professions that serve domestic animal agriculture, and aquaculture directly or indirectly. These include positions in management, sales, financial services, agricultural extension, consulting services, teaching, journalism, laboratory technology, and research. Preparation for veterinary medicine or other professional schools or graduate study may be achieved by careful planning in the major.

Both aquaculture and domestic animal agriculture are included in Animal Science. Students specializing in aquaculture are advised by faculty members from this area of study.

An Animal Science option is available in the Agricultural Science and Management major. This option places greater emphasis on economics, business, and management than the Animal Science major.

## B.S. Major Requirements:

	UNITS
<b>Written/Oral Expression</b> .....	<b>7-8</b>
See College requirement .....	7-8
<b>Preparatory Subject Matter</b> .....	<b>56</b>
Animal science (Animal Science 1, 2, 41, and 41L) .....	12
Biological sciences (Biological Sciences 1A, 1B, 1C) .....	15
Chemistry (Chemistry 1A, 1B, 8A, 8B) .....	16
Computer science (Agricultural Science and Management 21) .....	3
Mathematics (Mathematics 16A-16B or more advanced mathematics courses) .....	6
Statistics (Statistics 102 or Agricultural Science and Management 150 or other courses in quantitative skills with prior approval of the master adviser) .....	4
<b>Breadth/General Education</b> .....	<b>6-24</b>
Satisfaction of General Education requirement .....	6-24

## Animal Science

(College of Agricultural and Environmental Sciences)

\_\_\_\_\_ Ph.D., Chairperson of the Department

Department Office, 2223 Meyer Hall (916-752-1250)

### Faculty

Thomas E. Adams, Ph.D., Associate Professor

Gary B. Anderson, Ph.D., Professor

C. Robert Ashmore, Ph.D., Professor

R. Leland Baldwin, Jr., Ph.D., Professor

Patricia J. Berger, Ph.D., Associate Professor

G. Eric Bradford, Ph.D., Professor

Dan L. Brown, Ph.D., Assistant Professor

C. Christopher Calvert, Ph.D., Associate Professor

Floyd D. Carroll, Ph.D., Professor Emeritus

Ernest S. Chang, Ph.D., Associate Professor

Wallis H. Clark, Jr., Ph.D., Professor

Douglas E. Conklin, Ph.D., Lecturer

Fred S. Conte, Ph.D., Lecturer

Perry T. Cupps, Ph.D., Professor Emeritus

NOTE: For key to footnote symbols, see page 133.

**Depth Subject Matter .....58-68**

Physiological Sciences 101A-101B (Biochemistry 101A-101B may be substituted with consent of adviser).....6-7  
 Genetics, Genetics 100, Animal Genetics 107 .....9  
 Nutrition, Nutrition 110, and 115 or 124 (124 for Aquaculture option) .....8-9  
 Physiology, Physiology 110, and Wildlife and Fisheries Biology 121 (for Aquaculture option) .....5-9  
 Laboratory, one course from Animal Science 135, Microbiology 177L, Biochemistry 101L, Clinical Pathology 102, Physiology 110L .....2-6  
 Animal science (28 units minimum) .....28  
 At least two courses from Animal Science 113, 114, 115, 116, 140, 160; and the balance from Animal Science 104, 105, 106, 113, 114, 115, 116, 120, 120L, 123, 124, 128, 131, 133, 135, 140, 160; Microbiology 177, 177L, Animal Genetics 108, Physiology 121, 121L, 130, Nutrition 122, 122L, 123, 124 OR Aquaculture option, one course from Animal Science 113, 114, 115, 116, 118, 140, 160; at least 12 units from Animal Science 104, 105, 106, 120, 120L, 123, 124, 128, 131, 133, 135, Animal Genetics 108, 109, Nutrition 122, 122L, 123, 124, Physiology 121, 121L, 130, Agricultural Engineering Technology 161A, 161B; and at least 12 units from Zoology 100, 100L, 112-112L, 142, Wildlife and Fisheries Biology 120, Environmental Studies 151, 151L, Microbiology 177, 177L

**Unrestricted Electives .....26-56****Total Units for the Degree .....180**

**Master Adviser.** G.B. Anderson.

**Advising Center** for the major is located in 1149 Meyer Hall. Students must secure their academic adviser through this office upon entering the major.

**Graduate Study.** The Department of Animal Science offers a program of study and research leading to the M.S. degree. Detailed information may be obtained by contacting the graduate adviser. See also the Graduate Division section in this catalog.

**Graduate Adviser.** C.C. Calvert.

## Courses in Animal Science

### Lower Division Courses

#### 1. Domestic Animals and People (4) I. Brown

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. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10.

#### 2. Introductory Animal Science (4) III. Berger

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1 and Biological Sciences 1A recommended. Growth, reproduction, lactation, inheritance, nutrition, and disease control in domesticated animals; species used in aquaculture; the application of sciences to animal production. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Animal Science 1 and Biology 10.

#### 15. Introductory Horse Husbandry (3) II. Roser

Lecture—3 hours. Prerequisite: course 2 recommended. 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.

#### 21. Livestock and Dairy Cattle Judging (2) III. Van Liew

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.

#### 22A-22B. Animal Judging (2-2) I-II. Van Liew

Laboratory—6 hours; weekend field trips. Prerequisite: course 21 or the equivalent. Study of individual and group classes of animals with emphasis on visual appraisal of conformation and its accurate description. Course is required for intercollegiate judging competition. (P/NP grading only.)

#### 41. Domestic Animal Production (2) I. DePeters

Lecture—2 hours. Prerequisite: courses 1 and 2. Principles of farm animal management, including dairy and beef cattle, sheep, and swine. Industry trends, general husbandry, nutrition, and reproduction.

#### 41L. Domestic Animal Production Laboratory (2)

I, II. DePeters (in charge), Van Liew

Laboratory—6 hours. Prerequisite: course 41 (may be taken concurrently). Animal production principles and practices, including field trips to dairy cattle, beef cattle, sheep and swine operations, and campus laboratories. (P/NP grading only.)

#### 49A-49B-49C. Animal Management Practices (2-2)

2) I-II-III. The Staff

Discussion—1 hour; laboratory—3 hours. The application of the principles of elementary biology; the art and science of management of beef and dairy cattle, dairy goats, horses, sheep, swine, and laboratory animals. (P/NP grading only.)

#### 92. Internship in Animal Science (1-12) I, II, III. The Staff (Department Chairperson in charge)

Laboratory—3-18 hours. Prerequisite: consent of instructor. Work-learn experience 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 Request form must be met. (P/NP grading only.)

#### 98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

#### 104. Principles of Domestic Animal Behavior (3) I.

Price

Lecture—3 hours. Prerequisite: Biological Sciences 1A or 1B or the equivalent. Basic principles of animal behavior as applied to domesticated species. Emphasis will be placed on behavioral development and social behavior. External (exogenous) and physiological mechanisms influencing behavior will be discussed. (Students who have received credit for Zoology 155 may receive only 2 units for this course.)

#### 105. Behavioral Adaptations of Domestic Animals (2) II. Price

Lecture—2 hours. Prerequisite: course 104 or the equivalent. To provide an in-depth examination of the behavior of domestic animals and the role of behavior in management.

#### 106. Domestic Animal Behavior Laboratory (2) II.

Price

Laboratory—6 hours. Prerequisite: course 104 or the equivalent. Research experience with the behavior of large domestic animals. Experimental design, methods of data collection and analysis, and reporting of experimental results.

#### 113. Principles of Swine Production (4) I. Berger, Calvert, Parker

Lecture—3 hours; laboratory—3 hours; one Saturday field trip. Prerequisite: Physiological Sciences 101B; Physiology 110; Genetics 100. Production of the various classes of swine as related to breeding, nutrition, metabolism, and reproduction.

#### 114. Dairy Cattle Production (4) III. DePeters

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 124, Animal Genetics 107, and Nutrition 115 or the equivalent background in lactation, animal breeding and nutrition. Scientific principles from genetics, nutrition, physiology and related fields applied to conversion of animal feed to human food through dairy animals. Genetic, environmental, and managerial sources of variation in milk composition and yield; economic and energetic efficiency of milk production.

#### 115. Advanced Horse Production (4) I. Roser

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 15; Genetics 100; Nutrition 110 or 115; Physiology 110; 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.

#### 116. Beef Cattle and Sheep Production (4) III.

Bradford, Zinn

Lecture—3 hours; laboratory—3 hours; one or two Saturday field trips. Prerequisite: course 41; Animal Genetics 107; Nutrition 110 or 115; Physiology 110; course 123 recommended. Application of principles of nutrition, physiology and genetics to development of efficient management practices for beef cattle and sheep production. Resources used: similarities and differences between the species affecting management practices; range and feedlot operations; improving carcass and meat quality.

#### 118. Aquatic Animal Production (4) III. Gall, Doroshov

Lecture—3 hours; discussion—1 hour. Prerequisite: course 131; Animal Genetics 107; Nutrition 124 (may be taken concurrently). Breeding, feeding and management of aquatic animals; application of basic principles of animal science to the conversion of animal feeds to human food; genetic, environmental and managerial sources of variation in production efficiency; emphasis on trout, catfish and oysters.

#### 120. Principles of Meat Science (3) III. Bandman (Food Science and Technology), Lee

Lecture—3 hours. Prerequisite: Biochemistry 101B or the equivalent. 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.)

#### 120L. Meat Science Laboratory (2) III. Lee, Bandman (Food Science and Technology)

Discussion—1 hour; laboratory—3 hours. Prerequisite: Biochemistry 101B; course 120 (may be taken concurrently). 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. (Same course as Food Science and Technology 120L.)

#### 123. Animal Growth (4) II. Ashmore, Lee, Bradford

Lecture—4 hours. Prerequisite: Genetics 100, Physiological Sciences 101B or Biochemistry 101B. Basic and practical aspects of prenatal and postnatal growth and development. Emphasis on genetic, hormonal, and biochemical control of meat protein accumulation.

#### 124. Lactation (4) II. Baldwin

Lecture—3 hours; laboratory—3 hours. Prerequisite: Physiology 110; Nutrition 110; or the equivalent background knowledge. 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.

#### 128. Linear Programming in Animal Agriculture (3) II. Fadel

Lecture—2 hours; laboratory—2 hours. Prerequisite: upper division standing; Nutrition 110, 115 or the equivalent; understanding of animal production, or consent of instructor. Linear programming in animal

agriculture emphasizing farm planning and ration formulation. Provides experience in understanding, developing and applying linear programs.

**131. Reproduction and Early Development in Aquatic Animals** (4) II. Doroshov

Lecture—3 hours; laboratory—3 hours. Prerequisite: Zoology 100; Wildlife and Fisheries Biology 120, 121; or consent of instructor. Physiological and developmental functions related to reproduction, breeding efficiency and fertility of animals commonly used in aquaculture.

**133. Meat and Meat Animal Evaluation** (3) I. Lee

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 2 or 21 recommended. Correlation of live animal conformation and degree of finish with carcass traits, transformation of live animal to carcass, criteria for evaluation and grading of carcasses as related to meat palatability, ante- and post- mortem handling as related to meat quality.

**135. Experimental Biochemistry Laboratory** (4) I.

Ashmore

Lecture—2 hours; laboratory—6 hours. Prerequisite: one course each in biochemistry and physiology; consent of instructor. Course designed to introduce student to concepts of research. Experience in research animal care, tissue sampling and handling techniques, a variety of commonly used laboratory analytical methods, cost analysis, literature review and publication writing are provided. (Not open to students who have received credit for Biochemistry 101L.)

**140. Management of Laboratory Animals** (4) I.

Adams

Lecture—3 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 110 or 115; Physiology 110. Application of the concepts of nutrition, physiology, and genetics to maintenance of experimental animals. Management procedures will be examined in view of experimental needs, government regulations, and animal health.

**160. Range Livestock Production** (3) III. Morris, Raguse (Agronomy and Range Science)

Lecture—3 hours. Prerequisite: course 2, Range Science 133. Application of principles of animal and range science to the extensive production of livestock and related products from range. Emphasis on beef and sheep production systems from perennial and annual range types. (Same course as Range Science 160.)

**190C. Research Group Conference** (1) I, II, III. The Staff (Chairperson in charge)

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.)

**192. Internship in Animal Science** (1-12) I, II, III.

The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learn experience 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 Request Form must be met. (P/NP grading only.)

**197T. Tutoring in Animal Science** (1-2) I, II, III. The Staff (Chairperson in charge)

Tutoring—1-2 hours. Prerequisite: Animal Science or related major; advanced 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 once for credit. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates**

(1-5) I, II, III. The Staff (Chairperson in charge.) Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**206. Models in Agriculture and Nutrition** (3) II.

Fadel

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. Offered in odd-numbered years.

**215. Advanced Concepts of Growth Regulation**

(3) I. Oberbauer

Lecture—3 hours. Prerequisite: Biochemistry 101B; Genetics 102B; Zoology 121A-121B. Cellular and molecular mechanisms of growth regulation. Topics include cellular proliferation and differentiation in both tissue culture and animal models. Autocrine, paracrine, and transacting factors are discussed. Emphasis on critical reading and writing, including development of an optional research proposal.

**216. Grant Writing Techniques** (1) II. Oberbauer

Lecture—1 hour. Prerequisite: course 215. Introduction to the peer-reviewed grant writing process. Sources of funding, proposal description, budget calculations, and the review mechanism will be discussed. Proposals written in course 215 will be revised. (S/U grading only.)

**235. Advanced Techniques in Animal Nutrition**

**Research** (2) I, II, III. The Staff (Calvert in charge)

Lecture—1 hour; laboratory—3 hours. Prerequisite: graduate standing and consent of instructor. Application of advanced laboratory techniques to animal nutrition research; use of mechanistic models for experimental design and data analyses; surgical preparations useful in nutrition research; review of current literature. May be repeated for credit when topics differ. (S/U grading only.)

**290. Seminar** (1) I, II, III. The Staff (Chairperson in charge)

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.)

**290C. Research Group Conference** (1) I, II, III. The Staff (Chairperson in charge)

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.)

**297. Supervised Teaching In Animal Science** (2) I, II, III. The Staff (Chairperson in charge)

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.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (Sect. 1, 2, 3—letter grading; from Sect. 4 on—S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

Daniel J. Crowley, Ph.D., Professor (*Anthropology, Art History*)

Richard T. Curley, Ph.D., Lecturer

William G. Davis, Ph.D., Associate Professor

Jack D. Forbes, Ph.D., Professor (*Anthropology, Native American Studies*)

Charles R. Hale, Ph.D., Assistant Professor

Sarah B. Hrdy, Ph.D., Professor

Suad Joseph, Ph.D., Associate Professor

Smadar Lavie, Ph.D., Assistant Professor

Henry M. McHenry, Ph.D., Professor

Monique Borgerhoff Mulder, Ph.D., Assistant Professor

David L. Olmsted, Ph.D., Professor

<sup>2</sup> Peter S. Rodman, Ph.D., Professor

G. William Skinner, Ph.D., Professor (*Anthropology, Center for Comparative Research*)

David G. Smith, Ph.D., Professor

Janet S. Smith, Ph.D., Associate Professor

Delbert L. True, Ph.D., Professor

Carolyn F. Wall, Ph.D., Lecturer

John T. Walton, Ph.D., Professor (*Anthropology, Sociology*)

Aram A. Yengoyan, Ph.D., Professor

**The Major Program**

Anthropology is a diverse field with many subdisciplines, subdivided at Davis into four categories—biological, social/cultural, linguistics, and archaeology. The student who majors in anthropology learns about the social, biological, and linguistic dimensions of human social life—past and present—and gains a broad understanding of humans and society that is unparalleled in other disciplines. The anthropology student learns to evaluate evidence, think critically and write clearly and, following graduation, may wish to pursue graduate studies in anthropology or in a related field such as social welfare, museum work, education, law, or international development.

Students interested in the scientific study of human origins, primate studies and the fundamentals of biology as these relate to *Homo sapiens* should enroll in the Bachelor of Science degree program. Students interested in ethnography and the ethnology of selected culture areas or linguistics (language in culture and society and linguistic field methods) should enroll in the Bachelor of Arts degree program. Students interested in archaeology (prehistory and the techniques and methods of archaeology) should consult an adviser before choosing one degree program or the other.

**A.B. Major Requirements:**

UNITS

**Preparatory Subject Matter** ..... 24-39

Anthropology 1, 2, 3, 4 ..... 16

Statistics 13 ..... 4

Geography 1 or Environmental Studies 30...4

Foreign language (15 units or the equivalent in one language) ..... 0-15

**Depth Subject Matter** ..... 40

Anthropology 110, 128, 137, 170 ..... 16

Linguistic anthropology, one course ..... 4

Biological anthropology, one course ..... 4

Ethnography, one course ..... 4

Archaeology, one additional course ..... 4

An additional 8 units selected from the following: any upper division anthropology course, Art 150, 151, Genetics 100 ..... 8

**Total Units for the Major** ..... 64-79

**B.S. Major Requirements:**

UNITS

**Preparatory Subject Matter** ..... 45-56

Anthropology 1, 2, 3, 4 ..... 16

Biological Sciences 1A, 1B ..... 10

Chemistry 1A, 1B ..... 10

Statistics 13, 32, or 102 ..... 3-4

Chemistry 8A-8B or Mathematics 16A-16B ..... 6

Foreign language (10 units or the equivalent in one language) ..... 0-10

**Anthropology**

(College of Letters and Science)

David G. Smith, Ph.D., Chairperson of the Department

Department Office, 330 Young Hall  
(916-752-0745/0746)

**Faculty**

John M. Beaton, Ph.D., Assistant Professor

Robert L. Bettinger, Ph.D., Professor

<sup>3,4</sup> David J. Boyd, Ph.D., Associate Professor

<b>Depth Subject Matter</b>	<b>45</b>
Six courses in anthropology, including courses 152, 153 and 154A, and the remaining 3 chosen in consultation with major adviser	22-25
Genetics 100 and either Genetics 103 or Zoology 148	7
Additional units from the list below to achieve a minimum of 45 upper division units. Include at least one laboratory course in human or vertebrate anatomy.	
<b>Total units for the Major</b>	<b>90-101</b>

**Recommended**

Geology 1, 1L, 3, 3L; Physics 5A, 5B, 5C; Psychology 1, 15.

**Bachelor of Science List of Courses**

Biological anthropology, Anthropology 151, 152, 153, 154A, 154B, 155, 156, 157, 157L, 158.

Upper division courses outside the Department: Anatomy 100; Biochemistry 101A, 101B; Botany 140; Environmental Studies 100, 125; Epidemiology and Preventive Medicine 402, 403, 404; Genetics 100, 102A, 102B, 103, 104, 105, 106, 107; Geography 117; Geology 106, 107; Human Anatomy 101; Physical Education 103, 115; Physiological Sciences 101A, 101B; Physiology 110, 110L; Psychology 108, 112, 150; Statistics 104, 106, 108, 110, 130A, 130B; Zoology 100, 105, 106, 125, 136, 141, 147, 148, 155.

**Major Advisers.** A.B. degree: R. Curley, D.L. True, C.F. Wall; B.S. degree: H.M. McHenry, P.S. Rodman.

**Minor Program Requirements:**

	UNITS
<b>Anthropology</b>	<b>19-24</b>
<b>General emphasis</b>	<b>22-25</b>
One course from Anthropology 114, 117, 120	4
One course from Anthropology 151, 152, 153, 154A, 154B, 155, 156, 157, 157L, 158	2-5
One course from Anthropology 170, 171, 173, 174, 175	4
One course from Anthropology 140A, 140B, 141A, 141B, 141C, 142, 143, 144, 145, 146, 147, 148A, 148B, 149, 176	4
One course from Anthropology 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 133, 135, 136, 137, 138	4
One additional course from remaining upper division Anthropology courses	4-4
<b>Biological emphasis</b>	<b>18-21</b>
Anthropology 152, 153, 154A	13
Two additional upper division Anthropology courses chosen in consultation with B.S. degree undergraduate adviser	5-8

<b>Social-Cultural emphasis</b>	<b>18-21</b>
Anthropology 137	4
One course from Anthropology 140A, 140B, 141A, 141B, 141C, 142, 143, 144, 145, 146, 147, 148A, 148B, 149, 176	4
Two courses from Anthropology 101, 114, 117, 118, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 133, 135	8
One additional upper division Anthropology course chosen in consultation with A.B. degree undergraduate adviser	2-5

<b>Teaching Credential Subject Representative.</b>	<b>—</b> See also the Teacher Education Program.
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**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 the Graduate Division.

**Graduate Adviser.** P.S. Rodman.

**Courses in Anthropology****Lower Division Courses**

<b>1. Human Evolutionary Biology</b>	<b>(4) I. McHenry; II. D.G. Smith; III. P.S. Rodman</b>
Lecture—3 hours; discussion—1 hour. Introduction to human evolution. Processes and course of human evolution; man's place in nature and the study of primates; the biological variability of living man and the genetic background. General Education credit: Nature and Environment/Introductory. (CAN Anth 2)	

<b>2. Cultural Anthropology</b>	<b>(4) I. Davis; II. Lavie; III. Curley</b>
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. General Education credit: Contemporary Societies/Introductory. (CAN Anth 4)	

<b>3. Introduction to Archaeology</b>	<b>(4) I. True</b>
Lecture—3 hours; discussion—1 hour. Development of archaeology as an anthropological study; objectives and methods of modern archaeology. (CAN Anth 6)	

<b>4. Introduction to Anthropological Linguistics</b>	<b>(4) I. Wall</b>
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. General Education credit: Contemporary Societies/Introductory.	

<b>5. Proseminar in Biological Anthropology</b>	<b>(4) III. The Staff</b>
Seminar—3 hours; term paper. Prerequisite: course 1 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.	

<b>15. Behavioral and Evolutionary Biology of the Human Life Cycle</b>	<b>(5) I. Chisolm; II. Rodman; III. Borgerhoff, Mulder</b>
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. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10, Anthropology 1, or Genetics 10.	

<b>23. Introduction to World Prehistory</b>	<b>(4) III. Beaton</b>
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. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Anthropology 3.	

<b>25. Cross-Cultural Communication</b>	<b>(4) III. Wall</b>
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4, or course 2 and Linguistics 1. Description and analysis of communicative behavior in multi-ethnic societies. Analysis and cross-cultural comparison of linguistic and nonlinguistic communication in face-to-face interaction. Language as a sociocultural resource. Conversation and more formal speech genres. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 4; or Anthropology 2 and Linguistics 1.	

<b>98. Directed Group Study</b>	<b>(1-5) I, II, III. The Staff (Chairperson in charge)</b>
Primarily intended for lower division students. (P/NP grading only.)	
<b>99. Special Study for Undergraduates</b>	<b>(1-5) I, II, III. The Staff (Chairperson in charge)</b>
Prerequisite: consent of instructor. (P/NP grading only.)	

**Upper Division Courses**

<b>101. Human Ecology</b>	<b>(4) I. Richerson (Environmental Studies), Borgerhoff, Mulder</b>
Lecture—3 hours; discussion—1 hour. Prerequisite: one course from course 1, 2, Environmental Studies 30, Genetics 10, or the equivalent. Critical variables in the processes that relate humans and their environment. Emphasis on the biological, cultural, social, and psychological forces which encourage stability or change in human ecological relationships. (Same course as Environmental Studies 101.) General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 1, 2, Biological Sciences 10, Environmental Studies 1, 30, Geography 2, or Sociology 2.	
<b>(a) Anthropological Linguistics</b>	
<b>110. Elementary Linguistic Analysis</b>	<b>(4) II. Olmsted</b>
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4 or Linguistics 1. Analytical techniques of articulatory phonetics, phonemics, morphophonemics, and morphology.	

<b>111. Intermediate Linguistic Analysis</b>	<b>(4) III. Olmsted</b>
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Continuation of course 110. Advanced work in phonemics, morphophonemics, morphemics, and tactics.	
<b>112. Comparative Linguistics</b>	<b>(4) I. Olmsted</b>
Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Linguistic prehistory, historical linguistics, and reconstruction.	
<b>113. Indigenous Languages of North America</b>	<b>(4) II. The Staff</b>

<b>Lecture</b>	<b>—</b>

<b>114. The Ethnography of Speaking</b>	<b>(4) II. Wall</b>
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4, or course 2 and Linguistics 1. Description and analysis of language usage in social context and of the sociocultural knowledge it reflects. Structure of speech events within communities: language in formal and informal contexts, ritual use of language, and linguistic means of marking social identity.	

<b>115. Language and Society</b>	<b>(4) III. J.S. Smith</b>
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4, or Linguistics 1 and course 2. Patterned covariation of language and social factors. Methods of data collection and analysis. Identification of socially significant linguistic variables. Contributions of the quantitative study of speech to linguistic theory.	

<b>116. Language and Ethnicity</b>	<b>(4) I. J.S. Smith</b>
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4, or course 2; Linguistics 1. Exploration of the role of language in creating and maintaining ethnic identity in multiethnic societies. Examination of theoretical approaches to language variation and their utility in the interpretation of patterns of ethnic mother tongue and standard language use across groups.	

<b>117. World Writing Systems</b>	<b>(4) III. Macri</b>
Lecture—3 hours; discussion—1 hour. Prerequisite: course 4 or Linguistics 1. Survey of major world writing systems, including pictographic, syllabic, and alphabetic scripts used in both the Old and New Worlds in ancient and modern times, examined from linguistic and socio-political aspects.	

**120. Language and Culture (4) II. Wall**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 4; or course 2 and Linguistics 1. Culture, cognition, meaning, and interpretation; language and the classification of experience; communication and learning in crosscultural perspective.

**(b) Social-Cultural Anthropology****121. Folklore (4) III. Crowley**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or literary preparation acceptable to instructor. Theory and method in the study of folktales, myths, legends, proverbs, riddles, songs, and other forms of verbal tradition.

**122. Economic Anthropology (4) II. Davis**

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of instructor. Economic behavior in non-industrial societies; its social and cultural setting and its modern changes.

**123. Anthropology and Political Economy (4) II.**

Walton

Lecture—3 hours; discussion-laboratory—1 hour. Prerequisite: course 2 or consent of instructor. Survey of anthropological approaches to the study of political organizations; the interrelationships among political institutions, economic infrastructures and cultural complexity.

**124. Religion in Society and Culture (4) II. Curley**

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. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2.

**125. Structuralism and Symbolism (4) II. Yengoyan**

Lecture—3 hours; discussion-laboratory—1 hour. Prerequisite: course 2 or consent of instructor. Survey of anthropological approaches to understanding the logic of structuralism and symbolism in cultural analysis. Course focuses on how structural and symbolic interpretations relate to cultural and linguistic universals and to the philosophical basis of relativism in the social sciences.

**126. Anthropology of Development (4) I. Boyd**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of theories of social and economic change. Social and economic consequences of technological innovation. Application of anthropological theory to case studies of rural economy and society.

**127. Urban Anthropology (4) III. The Staff**

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.

**128. Kinship and Social Organization (4) III. Davis**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Theoretical discussion of social organization with primary emphasis on typology and classification of family and kinship systems.

**129. Psychological Anthropology (4) III. The Staff**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Comparative exploration of the "individual" in foraging, horticultural, pastoral, agricultural, and industrial societies. Impact of class and state formation, gender, ethnicity, poverty, ruralization, urbanization, economic and political change on the "individual." (Former course 119.) General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2, Psychology 15-16, Sociology 2.

**130. Gender and Sexuality: Cultural Evolutionary Perspective (4) II. Joseph**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. 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. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2, Psychology 15-16, or Sociology 2.

**131. Women and Development (4) II. Joseph**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. 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.

**\*132. Festivals and Carnivals (4) III. Crowley**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Ethnographic and folkloric analysis of selected festivals based on ethnic, religious, regional, class, vocational, and other affiliations.

**133. Cultural Ecology (4) III. Orlove**

Lecture—3 hours; discussion—1 hour. Comparative survey of the interaction between diverse human cultural systems and the environment. Primary emphasis given to people in rural and relatively undeveloped environments as a basis for interpreting more complex environments. (Former course 141.) (Same course as Environmental Studies 133.) General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2.

**\*134. Race and Sex: Race Mixture and Mixed Populations (4) I. Forbes**

Lecture—3 hours; discussion—1 hour. Phenomena of race mixture (miscegenation), interracial marriage, and mixed (hybrid) human populations. Emphasis on social and cultural effects of race mixture and of the interaction of racism and sexual behavior. (Former course 104.)

**\*135. Peasant Society and Culture (4) II. Orlove**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Comparative study of peasant communities, utilizing historical and ethnographic sources; analysis of urban-rural relations; problems of economic development and culture change. (Former course 162.)

**136. Visual Anthropology (4) III. Curley**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 128 or 137. Overview of film use in anthropology and its advantages and limitations in comparison to written ethnographic descriptions. Essential features of ethnographic films emphasized. Film production as an aspect of anthropological research and problems encountered in producing films in the field.

**137. Theory in Social-Cultural Anthropology (4) I. Boyd**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Comparative overview of major theoretical orientations in social-cultural anthropology, including evolutionary, historical, functional, ecological, psychological, structural, symbolic, and marxian approaches. Selected controversies are examined to clarify strengths and limitations of extant theories. (Former course 102.)

**\*138. Ethnographic Research Methods in Anthropology (4) II. Boyd**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 2 and 137. 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.

**140A. Cultures and Societies of West and Central Africa (4) I. Curley**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. 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. (Former course 139A.)

**\*140B. Cultures and Societies of East and South Africa (4) I. Curley**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. 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. (Former course 139B.)

**\*141A. Indians of North America (4) I. The Staff**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Introductory survey of the Indians of North America: origins, languages, civilizations, and history. (Former course 105A.)

**141B. Native Americans in Contemporary Society (4) II. Forbes**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Sociocultural development of American Indian populations in modern times with emphasis upon North America. Attention will be given to contemporary Indian affairs and problems as well as to the background for present-day conditions. (Former course 108.)

**141C. Ethnography of California and the Great Basin (4) II. Bettinger**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 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 106B.)

**142. Peoples of the Middle East (4) III. Joseph**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. 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.)

**143. Ethnology of Southeast Asia (4) I. Yengoyan**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. 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.

**144. Contemporary Societies and Cultures of Latin America (4) II. Orlove**

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.

**145. Colonialism and Ethnicity in the Caribbean (4) I. Crowley**

Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 2 or Afro-American Studies 10. Examination of the contemporary Caribbean nations, sketching their diverse geography, history, and economic life, then showing how selected nations have attempted to solve the problems arising from ethnic diversity in nation-building. (Former course 140.)

**146. Indigenous Peoples of Mexico and Central America (4) III. Rouse**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Ethnographic survey of the native peoples of Mexico and Central America: their histories, socio-political organization, mythologies, languages, material culture, writing systems.

**147. Peoples of the Pacific (4) III. Boyd**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Ethnographic survey of aboriginal cultures of Oceania. Comparison of origins, prehistory, and traditional social organization of peoples of Polynesia, Micro-nesia, and Melanesia. Consideration of recent changes associated with colonialism and national independence.

**148A. Traditional Chinese Society** (4) III. Skinner Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Analysis of society, culture, and political economy of late traditional China to 1949. Additional attention given to nature of social change in this pre-modern agrarian civilization.

**\*148B. Communist Chinese Society** (4) III. Skinner Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Analysis of sociocultural change and economic development in the People's Republic of China. How the Chinese case relates to social science theory is also addressed.

**149. Culture of Japan** (4) III. J.S. Smith Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Development of Japanese cultural traditions; social structure and social trends. (Former course 191.)

*(c) Biological Anthropology*

**151. Primate Evolution** (4) III. McHenry

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Biological Sciences 1B. Origin and relationships of the prosimians, monkeys, and apes.

**152. Human Evolution and Fossil Man** (4) II. McHenry

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Biological Sciences 1B. Nature and results of the evolutionary processes involved in the formation and differentiation of mankind. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Anthropology 1.

**153. Human Biological Variation** (4) I. D.G. Smith Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Biological Sciences 1B. Origin, adaptive significance and methods of analysis of genetic differences among human populations. Special attention will be given to racial differences such as those in blood groups, plasma proteins, red cell enzymes, physiology, morphology, pigmentation and dermatoglyphics. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Anthropology 1.

**154A. The Evolution of Primate Behavior** (5) I. The Staff

Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: course 1. 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.

**\*154B. Ecology and Sociobiology of Primates** (4) III. Rodman

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 154A, Statistics 13 (or the equivalent), and consent of instructor. Continuation of course 154A for students interested in methods of studying, describing and analyzing the ecology and sociobiology of primates. Laboratory consists of direct observation of captive primates and local birds with quantitative analysis of observations.

**\*155. Comparative Primate Anatomy** (4) III. The Staff

Lecture—2 hours; laboratory—4 hours. Prerequisite: Biological Sciences 1B. The functional anatomy of monkeys, apes, and man. Emphasis on the anatomical evidence for human evolution.

**156. Human Osteology** (4) III. The Staff

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or the equivalent. Introductory study of the human skeleton, including bone growth, pathology, radiology, evolution, dentition, and variations in race, sex, and age.

**\*157. Anthropological Genetics** (3) III. D.G. Smith

Lecture—3 hours. Prerequisite: course 1 or Biological Sciences 1A, and Genetics 100, 103, 105, or 106. Processes of micro-evolution responsible for biological differences among human populations. Special attention will be given to the adaptive significance of genetic variation in blood group antigens, serum proteins and red cell enzymes.

**\*157L. Laboratory in Anthropological Genetics** (2) III. D.G. Smith

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1 or Biological Sciences 1A, and either Genetics 100 or enrollment 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 agarose. (P/NP grading only.)

**\*158. The Evolution of Females and Males: Biological Perspective** (4) II. Hrdy

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Current theoretical frameworks for explaining the evolution of sex differences and for understanding the interrelationship between biological processes and cultural construction of gender roles.

*(d) Archaeology and Prehistory*

**170. Archeological Theory and Method** (4) II. Bettinger

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 3. 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. (Former course 103A.)

**171. Archaeology and the Environment** (4) I. Beaton

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Examines theoretical, methodological and practical considerations in reconstruction of environmental histories and their importance in studying human ecology through archaeology. Environmental and human population dynamics and their interactions are considered particularly for non-complex societies. (Former course 103B.)

**172. New World Prehistory: The First Arrivals** (4) II. True

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Survey of data relating to the peopling of the New World. Cultural adaptation and development of early inhabitants of North and South America. (Former course 103C.)

**\*173. New World Prehistory: Archaic Adaptations** (4) III. Bettinger

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor; course 170 recommended. 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. (Former course 103D.)

**\*174. New World Prehistory: Formative Life-ways in North and South America** (4) III. True

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Transition from hunting and gathering subsistence to sedentary farming in the American Southwest, Mississippi Valley, and Andean South America. (Former course 103E.)

**175. New World Prehistory: The High Cultures Mesoamerica and Andean South America.** (4) III. True

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Urban developments and the rise of civilization in Mexico and Peru. (Former course 103F.)

**\*176. Prehistory of California and the Great Basin** (4) II. True

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 or consent of instructor. Description and analysis of the prehistoric peoples of California and the Great Basin from earliest times to European contact. (Former course 106A.)

**177. Archaeology of the Pacific Rim** (4) II. Beaton

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3, 23 or consent of instructor; course 170 recommended. Archeological problems and evidence pertaining to human colonization of and subsequent adaptation to various environments found on the

Pacific Rim. Explanations are sought for important trajectories, trends and discontinuities in Pacific Rim culture histories.

**178. Hunter-Gatherers** (4) III. Bettinger

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. 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. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2.

**\*179. Ethnoarchaeology** (4) II. Beaton

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Relationships between behavior and its archeological consequences. Ethnography by archeologists examines residence patterning, site-formation processes, hunting/oraging behavior and other artifact creating activities and how these contribute to modern archeological thinking. (Former course 193.)

**181. Field Course in Archeological Method** (9)

Summer. The Staff

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. (Former course 195.)

**\*183. Laboratory in Archeological Analysis** (4) III

Bettinger

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 181 or consent of instructor. Museum preparation, advanced field investigation, and guidance in preparation of museum material for publication. May be repeated for credit with consent of instructor. Limited enrollment. (Former course 196.)

**184. Prehistoric Technology: The Material Aspects of Prehistoric Adaptation** (4) II. True

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or 3. 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.

*(e) Special Study Courses*

**194H. Special Study for Honors Students** (1-5) I, II, III. The Staff (Chairperson in charge)

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. (P/NP grading only.)

**197T. Tutoring in Anthropology** (1-5) I, II, III. The Staff

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) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses**

**201. History of Anthropological Theory** (4) I. Yen-goyan

Lecture—2 hours; discussion—1 hour; term paper. Historical development of the various fields of anthropology with emphasis upon their interrelationships.

**202. History and Theory of Biological Anthropology** (4) III. McHenry

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.

## 152 Applied Behavioral Sciences

### 203. History and Theory of Archaeology (3) I. Bettinger

Seminar—3 hours. History of thought in archaeology and analysis of research methods.

### 204. Contemporary Issues in Anthropological Theory (4) II. Davis

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) II. J.S. Smith

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) III. Joseph

Seminar—4 hours; individual student-instructor session (in-depth work on proposal writing). Prerequisite: consent of instructor. 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 once for credit. Limited enrollment.

### 209. Objectives and Methods for College Teaching of Anthropology (2) I, II, III. The Staff

Discussion—2 hours; assignments and reports. Prerequisite: normally limited to teaching assistants in anthropology. Analysis of the elements of effective teaching, drawing upon the student's experience in the classroom situation.

### 210. Aspects of Culture Structure (4) II. Yengoyan

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.

### 211. Advanced Topics in Cultural Ecology (3) I.

Orlove

Lecture—3 hours. Prerequisite: graduate standing; Anthropology/Environmental Studies 133 or the equivalent or consent of instructor. Discussion and evaluation of theories which relate environment, culture, and social structure. The works of several major theorists will be examined with regard to analytical models, empirical data, research methodologies, and modes of explanation. (Same course as Ecology 211.)

### 216. Problems in Archeological Method (4) II.

Beaton

Seminar—3 hours; term paper. Techniques for analyzing archeological data; application to various prehistoric cultures. May be repeated for credit with consent of instructor.

### \*217. Andean Prehistory: Theory and Method (4) II. True

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Discussion and evaluation of prehistoric occupations in the Andean Region of South America. Emphasis upon Pre-ceramic and early farming peoples.

### \*218. Topics in North American Prehistory (4) II.

Bettinger

Seminar—3 hours; term paper. Advanced study on current problems in North American prehistory and archaeology. May be repeated for credit only if material is unique for that student, and with consent of instructor.

### 220. Field Course in Linguistics (4) III. Olmsted

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) II. Orlove

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. Problems in Urban Anthropology (4) I.

Joseph

Seminar—3 hours; one paper. Prerequisite: graduate status or consent of instructor. Study of selected critical problems in urban anthropology. Each quarter focuses on some of the following topics: class, minorities, poverty, migration, religion, politics, kinship, community, sex-roles, communication, ideology, consciousness in urban context. May be repeated for credit.

### \*223. Economic Anthropology (4) III. Davis

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) II.

Curley

Seminar—3 hours; term paper. Advanced study of current problems in the anthropological study of religion.

### \*232. Political Movements (4) III. Walton

Seminar—3 hours; term paper. Prerequisite: completion of first-year graduate work recommended. 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) I. Curley

Seminar—3 hours; term paper. Diachronic analyses of traditional institutions in sub-Saharan Africa.

### \*240. Problems in Afro-American Studies (4) III.

Crowley

Seminar—3 hours; term paper. Comparative studies of selected Black communities in the New World.

### 241. Topics in North American Ethnology (4) III.

Forbes

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) II. Olmsted

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) II. Olmsted

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.

### \*252. Human Evolution Seminar (4) II. McHenry

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.

### 253. Seminar in Human Biology (4) I. D.G. Smith

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.

### \*254. Current Issues in Primate Sociobiology (4) I.

Rodman

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 different topic covered.

### 258. Evolution and Human Behavior (4) II. Hrdy

Seminar—3 hours; term paper. Prerequisite: courses 15; 101; 154 A or 154B; 158 or consent of instructor. Focus will be on reproductive strategies and parental investment. May be repeated for credit when topics vary.

### \*265. Concepts and Problems in Applied Anthropology (4) II. The Staff

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Advanced study in culture change; case studies of directed culture change; problems of planning and evaluation; uses of anthropological theory and data in professional fields such as agriculture, public health, administration, and international technical assistance.

### \*280. Ethnohistorical Theory and Method (4) II.

Forbes

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 devoted to the applied uses of ethno-history in the solution of contemporary social problems.

### 292. Seminar in Linguistic Anthropology (4) II. J.S. Smith

Seminar—3 hours; term paper. Selected topics in linguistic anthropology. May be repeated for credit when topic differs.

### 298. Group Study (1-4) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

### 299. Research (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

### 299D. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

## Applied Behavioral Sciences

(College of Agricultural and Environmental Sciences)

Michael P. Smith, Ph.D., Chairperson of the Department

Lawrence V. Harper, Ph.D., Vice Chairperson of the Department

Department Office, 106 AOB 4

Community Studies and Development (916-752-0770)

Human Development (916-752-0771)

### Faculty

Curt Acredolo, Ph.D., Lecturer

Louise M. Bachtold, Ed.D., Professor Emeritus

Keith Barton, Ph.D., Professor

Marc Braverman, Ph.D., Lecturer

Stephen B. Brush, Ph.D., Associate Professor

Brenda K. Bryant, Ph.D., Professor

Carol A. Cartwright, Ph.D., Professor

James Chisholm, Ph.D., Associate Professor

Noreen G. Dowling, Ph.D., Lecturer

Isao Fujimoto, M.A., Lecturer S.O.E.

Barbara G. Goldman, Ph.D., Lecturer and Supervisor of Teacher Education

James Grieshop, Ph.D., Lecturer

Lawrence V. Harper, Ph.D., Professor

Glenn R. Hawkes, Ph.D., Professor Emeritus

Elwood M. Juergenson, Ph.D., Professor Emeritus

Martin F. Kenney, Ph.D., Associate Professor

Rosemarie Kraft, Ph.D., Associate Professor

James G. Leising, Ph.D., Lecturer and Supervisor of Teacher Education

David B. Lynn, Ph.D., Professor Emeritus  
 E. Dean MacCannell, Ph.D., Professor  
 Loren Parks, Ph.D., Lecturer  
 Robert W. Pershing, M.Ed., Lecturer  
 Marc Pilisuk, Ph.D., Professor  
 Ernesto Pollitt, Ph.D., Professor  
 Michael P. Smith, Ph.D., Professor  
 Kay Jeanne Stockman, Ph.D., Lecturer  
 Orville E. Thompson, Ph.D., Professor Emeritus  
 Jane N. Welker, M.A., Senior Lecturer S.O.E.  
 Miriam J. Wells, Ph.D., Professor  
 Emmy E. Werner, Ph.D., Professor

## The Major Program

The Applied Behavioral Sciences major provides a broad, comparative understanding of social science theories, methodologies, and issues relevant to the study of communities and the people in them. The program is concerned with the study of social organization and change, and with the ways that information can be used to solve social problems and improve quality of life. The major emphasizes the integration of theory and practical experience and features a perspective on learning that stresses self-development and critical thinking.

Two identifying features of the major are: (1) its interdisciplinary character, enabling students to bring together courses from different disciplines; and (2) its emphasis on viewing social problems in context, enabling students to master not only a circumscribed area of expertise but to understand the social setting in which the expertise will be applied.

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 and the people in them. In addition, the Applied Behavioral Sciences major includes a student designed area of specialization to complement the student's academic and career interests. Examples of recently approved areas of concentration are: Organizational Planning and Management, Aging and Community Development, Community Health Development, Community Mental Health, Community Development and the Asian American, Socio-Environmental Planning, and Community Education.

Applied Behavioral Sciences graduates are prepared for occupations in community and human services. Areas of employment have been in community development, social research, program evaluation, organizational and educational consulting, city and regional planning, and community health. The major provides effective preparation for graduate or professional study in the social and behavioral sciences.

## B.S. Major Requirements:

	UNITS
<b>Written/Oral Expression</b> .....11-12	
See College requirement .....7-8	
Additional English (English 103) .....4	
<b>Preparatory Subject Matter</b> .....23-24	
Community development (Applied Behavioral Sciences 1) .....4	
Computer science (Agricultural Science and Management 21 or Computer Science Engineering 10) .....3	
Economic theory (Economics 1A or 1B) .....5	
Ethnicity and American communities (Applied Behavioral Sciences 2) .....4	
Social science theory (Anthropology 2 or Sociology 1) .....4	
Statistics (Statistics 13 or 32) .....3-4	
<b>Breadth/General Education Requirement</b> .....24	
Satisfaction of General Education requirement to include:	
Sciences and mathematics .....8	
Humanities (Proficiency in a second language is specifically useful to an understanding of particular aspects of the	

community. Students planning to work in a minority community are encouraged to select an appropriate language.) .....8	8
<b>Social sciences</b> .....8	8
<b>Depth Subject Matter</b> .....39	
Methods for community research, Applied Behavioral Sciences 151, and 160 or 161 .....8	8
Social theory and community change, Applied Behavioral Sciences 154 .....4	4
Institutional and organizational change, Applied Behavioral Sciences 164 .....4	4
Political processes and community change, one course from Applied Behavioral Sciences 157, 171, Anthropology 123, Political Science 101, 102, 103, 173 .....4	4
Economics and community change, one course from Applied Behavioral Sciences 162, Anthropology 122, Economics 115A, 115B .....4	4
Ethnicity and social inequality, Applied Behavioral Sciences 172 or 176 .....4	4
Community development and transfer of knowledge, one course from Applied Behavioral Sciences 152, 170, 173, 174, 175 .....4	4
Evaluation of human service programs, Applied Behavioral Sciences 168 .....4	4
Senior research project and seminar, Applied Behavioral Sciences 193A, 193B, 193C .....3	3
<b>Field of concentration</b> .....37	
Additional upper division courses related to the major, determined in consultation with faculty adviser. (Up to 5 units of variable-unit course work may be counted toward this requirement, e.g., Applied Behavioral Sciences 159, 192, 196, 197, 199.)	

### Unrestricted Electives .....44-46

### Total Units for the Degree .....180

#### Other Requirements

In consultation with a faculty and staff adviser, Applied Behavioral Sciences majors must develop a program of study which will comprise an area of specialization. Students must submit a written proposal for the major to be reviewed by a faculty committee. The department also requires satisfactory completion of a faculty supervised senior project.

**Major Adviser.** E.D. MacCannell.

**Advising Center** for the major is located in 101 AOB 4 (916-752-2244).

## Minor Program Requirements:

The Applied Behavioral Sciences faculty offers the following minor program:

	UNITS
<b>Community Development</b> .....24	
Applied Behavioral Sciences 1, 151, 152, 164 .....16	16
Two courses selected from the 160 and/or 170 series .....8	8
(a) Applied Behavioral Sciences 162, 163, 168	
(b) Applied Behavioral Sciences 171, 172, 173, 174, 175, 176, 178	

**Minor Adviser.** E.D. MacCannell.

**Graduate Study.** Refer to the Graduate Division section in this catalog.

**Related Courses.** See Environmental Studies 10, 101, 133.

## Courses in Applied Behavioral Sciences

### Lower Division Courses

#### 1. The Community (4) I. MacCannell

Lecture—4 hours. Basic concepts of community analysis and planned social change. The dynamics of community change through case studies of com-

munities including peasant, urban ghetto, suburban mainline, and California farm workers

#### 2. Ethnicity and American Communities (4) II. The Staff

Lecture—3 hours; discussion—1 hour. 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. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2.

#### 17. Population and Community (2) II. Fujimoto

Lecture—2 hours. Dynamics and challenges offered by demographic changes in California and the world community. Implications for individuals and communities. Special emphasis on the possible contributions each individual can make towards resolving global problems related to human ecology through local community action. (P/NP grading only.)

#### 18. Science and Society (3) III. The Staff

Lecture—2 hours; discussion—1 hour. Assumptions and biases in different fields of knowledge, taboo topics, and the nature of evidence in the public and academic communities; fit between University education and issues of society.

#### 47. Orientation to Community Resources (2) II.

Thompson; III. Fujimoto

Field trip—3 days; seminar—three 2-hour sessions. (Course given between quarters). Prerequisite: consent of instructor. Field trip to educational, social, and welfare agencies in California. Observation and discussion with staff members of different agencies which serve the needs of families and children. Advance reservations required. (P/NP grading only.)

#### 92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)

Field placement—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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

### Upper Division Courses

#### 151. Community Research and Analysis (4) II. Fujimoto

Lecture—4 hours. Prerequisite: course 1, Sociology 2, Anthropology 2, or Geography 5. Theories of community change and structure. Ethnographic, power structure and comparative approaches to community studies. Use of research in community development programs. Students work in teams and conduct fieldwork in nearby communities. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2, Geography 5, or Sociology 2.

#### 152. Community Development (4) II. Fujimoto

Lecture—4 hours. Prerequisite: course 151 or 1, Sociology 2, Anthropology 2, Geography 5, Asian-American Studies 100, Chicano Studies 132, or Afro-American Studies 101. Introduction to principles and strategies of community organizing and development. Examination of different citizen participation movements and the role of change agents in the development process. Students work in teams and conduct fieldwork in local communities.

#### 153. International Community Development (4) III. Fujimoto

Lecture—4 hours. Prerequisite: course 1, Anthropology 2, International Agricultural Development 10. Examination of community development efforts worldwide. Analysis of impact of global forces on community development in different settings. Alternative strategies with emphasis on self-reliance and locally controlled development. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Applied Behavioral

Sciences 151, Anthropology 2, or International Agricultural Development 10.

**154. Semiotics, Structuralism and Sociocultural Change** (4) II. MacCannell

Lecture—4 hours. Prerequisite: course 1, Sociology 1, or Anthropology 2. Existentialism, structuralism, and semiotics and their application to current social issues and problems: nuclear technology, women's movement, ethnic relations, and other change arenas. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2 or Sociology 2.

**157. Politics and Community Development** (4) III. Smith

Lecture—4 hours. Prerequisite: prior course work in sociology or political science recommended. 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.

**159. Field Experience in Community Development** (4) III. Fujimoto

Discussion—2 hours; fieldwork—6 hours. Prerequisite: course 151, 152, 153, or 154. Field involvement with community or organizational issues or problems and their resolution. May be repeated for credit for a maximum of 12 units with consent of instructor.

**160. Research Design and Method in Community Studies** (4) II. The Staff

Lecture—4 hours. Prerequisite: course 1; Statistics 13 or the equivalent. Application of behavioral science research methodology to multidisciplinary problems confronting communities and community organizations. Focuses on design, sampling, measurement and analysis.

**161. Ethnographic Research in America** (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: completion of 8 units of course work in Anthropology, Sociology, or Applied Behavioral Sciences. Methodologies, ethics and goals of qualitative research. Emphasis on analyzing and conducting ethnographic research in American communities; problem formulation, analytic modes, data correction and interpretation. Offered in odd-numbered years.

**162. People, Work and Technology** (4) I. Wells

Lecture—4 hours. Prerequisite: course work in the social sciences (e.g., Sociology 1, 3, Anthropology 137, Economics 1A, 1B) or labor history. Relationship between work, technology, and people's lives. Such topics as industrialization, bureaucratization, automation, the structure of work-linked communities, education and the labor market, work and the economic system and the future of work.

**163. Behavior of Community Organizations** (4) I. The Staff

Lecture—4 hours. Prerequisite: introductory social sciences course. How community organizations function and how members of organizations interact with each other, the organization, and those people who are clients of the organization. Effects of leadership, motivation, group dynamics, communications, and power.

**164. Theories in Organizational Change** (4) II. The Staff

Lecture—4 hours. Prerequisite: course 1 or 2. Development of approaches to planned change including normative re-educative, applied systems, and developmental strategies.

**\*165. Family Resource Management** (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Human Development 110; upper division standing. Influence of social, economic, political and technological environments on family roles, goals, and decisions. Examination of family resource management strategies and social support systems for families.

**168. Program Evaluation and the Management of Organizations** (4) I. Goldman

Lecture—3 hours; discussion—1 hour. Prerequisite:

course 160, 161, or the equivalent. Program evaluation and its relationship to organizational development and management functions. Focuses on internal evaluation and its role in program planning improvement and accountability.

**170. Communication of Innovations** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite:

upper division standing and course work in the social sciences; course 1 or Sociology 1 recommended.

Information exchange and innovation diffusion in organizational and social settings. Exploration of the role of information networks and communication channels in planned social change efforts. Philosophical consideration of the consequences of innovation dissemination.

**171. Housing and Social Policy** (4) III. Wells

Lecture—4 hours. Social impact, economics, and politics of housing in the United States. Special attention given to alternative policy strategies at the national levels.

**172. Social Inequality: Issues and Innovations** (4) III. Wells

Lecture—4 hours. Prerequisite: upper division standing; 8 units of sociology or anthropology or combination. Study of the phenomenon of inequality in the U.S. Various approaches to inequality will be examined, including structural and historical explanations, prejudice and discrimination, the "culture of poverty," and arguments concerning race, sex, and genetic potential.

**173. The Continuing Learner** (4) II. The Staff

Lecture—4 hours. Prerequisite: upper division standing. Theories of adult learning and teaching emphasizing the role of adult education in the community. Designing of adult education programs.

**174. Communication for Community Change** (4) I. Grieshop

Lecture—3 hours; discussion—1 hour. Prerequisite: upper-division standing and course 1 recommended. Applied communication programs used for creating community change. Planning and evaluating programs, social marketing, and other communication strategies and technologies. Ethics of change induced through communication are also considered.

**\*175. Education in the Community** (4) I. Grieshop

Lecture—4 hours. Prerequisite: upper division standing and course work in the social sciences; course 1 or Sociology 1 recommended. Function of education in the community. Relationships of community and non-formal education to formal education, schooling and to individual, community and national development. Planning process and role of education in social and community change. Offered in odd-numbered years.

**176. Comparative Ethnicity** (4) III. The Staff

Lecture—4 hours. Prerequisite: upper division standing, 8 units of sociology or anthropology or combination. Exploration of the role of ethnicity in shaping social systems and interaction. Examination of analytical approaches to and issues arising from the study of ethnicity, through utilization of data from a range of different societies.

**178. Social Networks and Community Health** (4) III. Pilisuk

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or Sociology 2. Relevance of social ties to the health of the individual, family and community. Multidisciplinary look at forces affecting family and friendship ties, as well as community services; and at how social bonds affect physical and psychological health. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Sociology 2.

**190. Current Issues in Applied Behavioral Sciences** (1) I, II, III. The Staff

Seminar—1 hour. Current social, political, and economic issues affecting communities and individuals. One-hour presentations by guest speakers on research topics and contemporary issues in Community Development. (P/NP grading only.)

**192. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)

Field placement—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Supervising internship, off and on campus, in community and institutional settings. (P/NP grading only.)

**193A-193B-193C. Applied Behavioral Sciences****Research Seminar** (1-1-1) I-II-III. The Staff

Seminar—1 hour. Prerequisite: upper division standing; Applied Behavioral Sciences major. Seminar on problem focused research. Includes processes for problem identification, methods for data collection and analysis and procedures for interpretation and report writing. (P/NP grading only.)

**196. Senior Project in Applied Behavioral Sciences** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: major in Applied Behavioral Sciences, and consent of instructor. Guided research leading to completion of senior thesis. May be repeated for credit. (P/NP grading only.)

**197T. Tutoring in Applied Behavioral Sciences** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Leading of small voluntary discussion groups. (P/NP grading only.)

**197C Community Tutoring in Applied Behavioral Sciences**

(1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. Supervised tutoring in the community. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates**

(1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

**Graduate Courses****201. Planning Processes in Applied Behavioral Sciences** (4) I. The Staff

Lecture—3 hours; supervised practice in planning—3 hours. Prerequisite: consent of instructor. Systematic approach to planning, including new concepts, theories, and methods for planning with application to educational institutions, agencies and the community at large.

**202. Systems Approach for Organizational Change** (4) II. The Staff

Lecture—4 hours. Prerequisite: course 201 or consent of instructor. Organizational structure and processes from systems perspective, organization-environment interplay, dynamics of resource allocation, impact of power and environment on structure, communication networks, role of innovation and determinants of change. Emphasis upon applications of theory for organizational learning.

**203. Evaluation and Decision Making** (4) III. Goldman

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing; knowledge of social science research design and methods. Focuses on theoretical formulations and methodological considerations when designing evaluation research studies for social programs. Includes examination of relationship between organizational planning, decision-making and evaluation research; value conflicts; multiple information requirements; social and political environment influencing evaluation studies.

**240. Community Development: Research and Analysis** (4) I. MacCannell

Seminar—4 hours. Prerequisite: course 160 or Sociology 46A or the equivalent and a course in statistics. Methods for analyzing institutional, community, and regional social structure, as preparation for planned change. Research design and the management of large-scale data files.

**241. The Economics of Community Development and Planning Strategies** (4) II. Rochin (Agricultural Economics)

Seminar—4 hours. Prerequisite: course 240 and a principle course in economics. Economic theory and planning strategies affecting nonmetropolitan communities. Human resources, community services and infrastructure, industrialization and technological change, policies and plans for mobilizing resources for community development.

**242. Community Development: Program Management (4) III. The Staff**

Seminar—4 hours. Prerequisite: course 241. Planning, organization, financing and administration of social change projects or programs at the community or city level.

**243. Professional Skills for Human Service and Community Development (4) I. Pilisuk**

Lecture—2 hours; seminar—2 hours. Prerequisite: graduate student standing in a social science discipline. Theory of interpersonal communication and small group process as applied to development of professional skills as community developer, program administrator and/or consultant.

**244. The Political Economy of Domestic Development (4) III. Kenney**

Lecture—4 hours. Prerequisite: course 241. Examination of the politics and institutions affecting the economic growth of regions. Theories of development and change are examined with specific reference to case study material.

**290. Seminar (1) I, II, III. The Staff**

Seminar—1 hour. Analysis of research in applied behavioral sciences. (S/U grading only.)

**297. Practicum in Community Development (2) I.**

Pilisuk; II. The Staff

Seminar—2 hours. Prerequisite: course 243 and field placement in community human service agency. Application of theories and approaches of community development through field placement in a community or human service agency. Further development of skills as change agents in community settings. Consideration of the field placement as it relates to relevant research. May be repeated for a maximum of 4 units. (S/U grading only.)

**298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

**299. Research (1-12) I, II, III. The Staff (Chairperson in charge)**  
(S/U grading only.)

from students who have prior training in engineering, physical and life sciences, mathematics, economics, and related fields. Applicants must have completed two years of undergraduate mathematics including linear algebra, differential equations, vector calculus and a rigorous course in advanced calculus is encouraged.

**Graduate Advisers.** D.O. Banks (Mathematics); A.M. Hastings (Design).

## Applied Physics

### See Physics

## Aquaculture

### See Animal Science; Agricultural Engineering Technology; and Wildlife and Fisheries Biology

## Art

(College of Letters and Science)

Cornelia Schulz, M.F.A., Chairperson of the Department

Department Office, 111A Art Building  
(916-752-0105)

## Art History

### Faculty

Joseph A. Baird, Ph.D., Professor Emeritus  
Daniel J. Crowley, Ph.D., Professor (Art, Anthropology)

Mary H. Fong, Ph.D., Professor

Robert J. Grigg, Ph.D., Associate Professor

Seymour Howard, Ph.D., Professor

Dianne Sachko Macleod, Ph.D., Associate Professor

Irit Rogoff, Ph.D., Assistant Professor

Jeffrey Ruda, Ph.D., Associate Professor

Deborah Weiner, Ph.D., Assistant Professor

### The Major Program

The History of Art program focuses upon the influential role of the visual arts in civilization. It examines works of art as illustrations of changing aesthetic and cultural viewpoints and as reflections of significant material and ideological developments in society. Art history is unusual among the humane disciplines in that it emphasizes visual as well as verbal intelligence, providing more than the standard advantages of a liberal arts training. This program offers a wide and representative introduction to the major fields and issues in art historical studies.

The major prepares students for advanced study either in graduate school, or in professional programs. It can also serve as the foundation for careers in teaching, research, museums, galleries, arts administration, art criticism, publishing, and art investment. Since the study of art history deals with the history of ideas and with different cultures, societies, and events as well as objects and images, we urge majors to strengthen their training with courses in history, literature, philosophy, foreign languages, and political science.

## Applied Mathematics (A Graduate Group)

J. Blake Temple, Ph.D., Chairperson of the Group  
Group Office, 551 Kerr Hall (916-752-8131)

**Faculty.** Consists of members from a variety of departments whose research interests are mathematically oriented. Departments represented include Agricultural Economics, Biological Sciences, Chemistry, Computer Science Engineering, Economics, Chemical, Civil, Electrical, and Mechanical Engineering, Environmental Studies, Epidemiology and Preventive Medicine, Genetics, Land, Air and Water Resources, Management, Mathematics, Obstetrics and Gynecology, Statistics, Wildlife and Fisheries Biology, and Zoology.

**Graduate Study.** Students prepare for careers relating to the application of mathematics to problems in the physical and life sciences, engineering, and management. The degree requirements consist of two years of rigorous training in applied mathematics followed by course work and a research dissertation under the direction of a member of the Applied Mathematics Graduate Group. The M.S. degree provides preparation (1) for further study in applied mathematics or an application area, or (2) for a career in industry or public service. The Ph.D. degree provides preparation for a career in research and/or teaching. Areas of research in the program include differential equations, fluid mechanics, numerical analysis, operations research, systems theory, probability and stochastic processes, mathematical biology, and mathematical physics. Detailed information may be obtained by writing to the Graduate Coordinator, Department of Mathematics.

New applicants are admitted to the fall quarter only.

**Preparation.** The program encourages application

## A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>28</b>
Art 1A, 1B, 1C, 1D, 25.....	20
One art studio course in drawing, graphics, painting, or photography.....	4
One art studio course in sculpture or ceramics.....	4
<b>Depth Subject Matter</b> .....	<b>36</b>
Nine upper division art history courses, which must be taken in at least five of the following seven areas .....	36
(a) Ancient	
(b) Medieval/Northern Renaissance	
(c) Southern Renaissance/Baroque	
(d) Modern Painting, Sculpture	
(e) Modern Architecture	
(f) China/Japan	
(g) Non-Literate	
<b>Total Units for the Major</b> .....	<b>60</b>

## Minor Program Requirements:

	UNITS
<b>Art History</b> .....	<b>20</b>
Five upper division art history courses (one lower division substitute course permissible).....	20
Courses must be chosen from at least three of the following subject areas with no more than two courses in any single area:	
(a) Ancient	
(b) Medieval/Northern Renaissance	
(c) Southern Renaissance/Baroque	
(d) Modern Painting, Sculpture	
(e) Modern Architecture	
(f) China/Japan	
(g) Non-Literate	

**Honors Program.** An Honors Program is available to Art History majors who are seriously considering attending graduate school. To be eligible for the program, a student must have a grade-point average of 3.7 in the major. In addition to meeting the standard major requirements, the honors student completes one quarter of language in German or Chinese, one seminar (courses 190 or 198), and writes an honors thesis (course 199). Students participating in this Program are candidates for Departmental recommendation for graduation with High or Highest Honors. See the Letters and Science section of this catalog and consult the Department for more information.

**Teaching Credential Subject Representative.** Department Chairperson. See also the Teacher Education Program.

**Graduate Study.** The Department of Art offers programs of study and research leading to the Master of Arts degree in History of Art as preparation for further graduate study or professional work. Further information may be obtained by writing to the Graduate Adviser or consulting the *Graduate Announcement*.

## Courses in Art (History)

### Lower Division Courses

**1A. Ancient Art (4) I. Howard**

Lecture—3 hours; discussion—1 hour. Art of the pagan Mediterranean world from the prehistoric caves to the fall of the Roman Empire. General Education credit with concurrent enrollment in course 1AG: Civilization and Culture/Introductory. (CAN Art Seq A)

**1AG. Writing: On Ancient Art (I) I. Howard**

Discussion—1 hour; short papers. Prerequisite: course 1A (concurrently). Small group discussions and preparation of short papers for course 1A. General Education credit with concurrent enrollment in course 1A: Civilization and Culture/Introductory.

**1B. Medieval and Renaissance Art (4) II.** Grigg  
 Lecture—3 hours; discussion—1 hour. Christian, Barbarian, Moslem, and Classical traditions in European Art from the fourth through the sixteenth centuries. General Education credit with concurrent enrollment in course 1BG: Civilization and Culture/Introductory. (CAN Art Seq A)

**1BG. Writing: On Medieval-Renaissance Art (1) II.** Grigg

Discussion—1 hour; short papers. Prerequisite: course 1B (concurrently). Small group discussions and preparation of short papers for course 1B. General Education credit with concurrent enrollment in course 1B: Civilization and Culture/Introductory.

**1C. Baroque and Modern Art (4) III.** Macleod

Lecture—3 hours; discussion—1 hour. Major styles and masters of the Western world after the Counter Reformation. General Education credit with concurrent enrollment in course 1CG: Civilization and Culture/Introductory. (CAN Art Seq A)

**1CG. Writing: On Baroque-Modern Art (1) III.** Macleod

Discussion—1 hour; short papers. Prerequisite: course 1C (concurrently). Small group discussions and preparation of short papers for course 1C. General Education credit with concurrent enrollment in course 1C: Civilization and Culture/Introductory.

**1D. Asian Art (4) II.** Fong

Lecture—3 hours; discussion—1 hour. Introduction to the arts of Asia through a study of Oriental ink painting and architecture, Buddhist sculpture, Indian temples, Chinese ceramics, Japanese prints, and art in Mao's China. General Education credit with concurrent enrollment in course 1DG: Civilization and Culture/Introductory.

**1DG. Writing: On Asian Art (1) II.** Fong

Discussion—1 hour; short papers. Prerequisite: course 1D (concurrently). Small group discussions and preparation of short papers for course 1D. General Education credit with concurrent enrollment in course 1D: Civilization and Culture/Introductory.

**1H. Introduction to Art: Art and Civilization (4) II.** Ruda

Lecture—3 hours; term paper or gallery studies and review. Looking at art to understand how aesthetic experience relates to its cultural context, in a variety of historical situations from ancient to modern times. Intended for students not specializing in art. (P/NP grading only.)

**\*15. Woman as Artist and Subject (4) I.** Macleod

Lecture—3 hours; discussion—1 hour. Assessment of women's contribution to the visual arts. Examines the role of women in context of major artistic and social movements from Renaissance to present. Two midterms; final examination. Offered in even-numbered years.

**\*20. Myths and Symbols in Chinese Art (4) III.** Fong

Lecture—3 hours; discussion—1 hour. Heritage of China as seen in the artistic expressions of its mythologies and symbols perpetuated in folk cults, ancestral worship, Confucian lores, Taoist legends, and Buddhist beliefs. Intended for non-majors.

**25. Introduction to Architectural History (4) III.** Weiner

Lecture—3 hours; discussion—1 hour. Formal and social history of architecture, examining design principles, major traditions, and concepts of architectural history with a focus on issues in Western architecture. Emphasis on nineteenth and twentieth centuries. General Education credit with concurrent enrollment in course 25G: Civilization and Culture/Introductory.

**25G. Writing: Introduction to Architectural History (1) III.** Weiner

Discussion—1 hour. Prerequisite: course 25 concurrently. Small group discussions and preparation of short papers for course 25. General Education credit with concurrent enrollment in course 25: Civilization and Culture/Introductory.

**98. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Restricted to lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**150. Arts of Subsaharan Africa (4) III.** Crowley

Lecture—3 hours; term paper or gallery studies and review. Traditional arts and crafts of subsaharan Africa; particular attention to the relationships between sculpture and culture in West and Central Africa.

**\*151. Arts of the Indians of the Americas (4) III.** Crowley

Lecture—3 hours; term paper or gallery studies and review. 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.

**\*152. Arts of Oceania and Prehistoric Europe (4) III.** Crowley

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.

**154A. Early Greek Art and Architecture (4) I.** Howard

Lecture—3 hours; gallery study and term paper. Prerequisite: upper division standing. Examination of history and significance of major monuments in Greek art and architecture from the Homeric, Geometric Age to the Golden Age and the death of Socrates.

**154B. Later Greek Art and Architecture (4) II.** Howard

Lecture—3 hours; gallery studies and term paper. Prerequisite: upper division standing. Examination of the history and significance of monuments in Greek art and architecture from the Silver Age of Aristotle to Alexander to the end of the Hellenistic Age and the death of Cleopatra.

**\*155. Roman Art (4) III.** Howard

Lecture—3 hours; term paper or gallery studies and review. The art of Republican and Imperial Rome.

**\*162. History of Printmaking (4) II.** Ruda

Lecture—3 hours; term paper or gallery studies and review. The development of graphic media in the Western World from the fifteenth century to the present.

**\*163A. Chinese Art (4) III.** Fong

Lecture—3 hours; term paper or gallery studies and review. A survey from the beginning to the twelfth century focusing on the major art forms that are traditionally known as well as newly discovered through archaeology in China.

**\*163B. Chinese Painting (4) III.** Fong

Lecture—3 hours; term paper or gallery studies and review. The unique form of ink painting, with or without colors, depicting human and animal figures, flowers-and-birds, and landscape—the favorite and enduring theme of the Chinese scholar-painter.

**163C. Painting in the People's Republic of China (4) III.** Fong

Lecture—3 hours; term paper. Prerequisite: course 1D or 163B. Analysis of the interaction between art and politics in the emergence of China into the modern world. Integration of Western influence, implementation of Mao Zedong's thought on art, and the formation of contemporary Chinese painting.

**164. The Arts of Japan (4) III.** Fong

Lecture—3 hours; term paper and/or gallery studies and review (determined by instructor each quarter course offered). Study of the significant achievements in architecture, painting, sculpture, and decorative arts from prehistoric age to nineteenth century.

**\*168. Great Cities (4) III.** Weiner

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 odd-numbered years.

**176A. Art of the Middle Ages: Early Christian and Byzantine Art (4) I.** Grigg

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.

**176B. Art of the Middle Ages: Early Medieval and Romanesque Art (4) III.** Grigg

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.

**\*176C. Art of the Middle Ages: Gothic (4) III.** Grigg  
 Lecture—3 hours; term paper or gallery studies and review. Painting, sculpture and architecture in northern Europe from the twelfth through the fifteenth centuries.

**177A. Northern European Art (4) III.** Grigg

Lecture—3 hours; term paper or gallery studies and review. Painting and sculpture of the fifteenth century in Austria, Germany, France and the Lowlands, including such artists as Jan van Eyck and Hieronymus Bosch.

**\*177B. Northern European Art (4) I.** Grigg

Lecture—3 hours; term paper or gallery studies and review. Painting and sculpture of the sixteenth century in Germany, France and the Lowlands, including such artists as Albrecht Dürer and Pieter Bruegel.

**178A. Italian Renaissance Art (4) I.** Ruda

Lecture—3 hours; term paper or gallery studies and review. Giotto and the origins of the Renaissance; painting and sculpture in Italy from Nicola Pisano through Lorenzo Monaco, with emphasis on Duccio, Giotto, and other leading artists of the early fourteenth century.

**178B. Italian Renaissance Art (4) II.** Ruda

Lecture—3 hours; term paper or gallery studies and review. Early Renaissance in Florence; fifteenth-century artists from Donatello and Masaccio through Botticelli, in their artistic and cultural setting.

**\*178C. Italian Renaissance Art (4) III.** Ruda

Lecture—3 hours; term paper or gallery studies and review. The High Renaissance: Leonardo, Michelangelo, Raphael, and Titian in their artistic and cultural settings—Florence, Rome, and Venice in the early sixteenth century. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Art 1B-1BG.

**\*179A. Baroque Art (4) I.** The Staff

Lecture—3 hours; term paper or gallery studies and review. Western European architecture, sculpture and the art of the garden from the late sixteenth through the early eighteenth centuries.

**179B. Baroque Art (4) I.** Ruda

Lecture—3 hours; term paper or gallery studies and review. Seventeenth-century painting, including such artists as Caravaggio, Rubens, Rembrandt, and Velázquez. Offered in odd-numbered years.

**182. British Art (1750-1914) (4) III.** Macleod

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1C. Analysis of the place of art in British culture — 1750 to 1914. Topics include influence of class and gender on art education, patronage, and exhibition societies. Artists: Hogarth, Turner, Pre-Raphaelites, and lesser-known advocates of military, social realist, and colonial themes.

**\*183A. Art in the Age of Revolution (4) II.** Macleod

Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Analysis of political and stylistic implications of European painting from 1750 to 1860. Artists studied include Goya, David, Delacroix, Constable, Turner, the Pre-Raphaelites, and Courbet.

**\*183B. Impressionism and Post-Impressionism (4) III.** Macleod

Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Social and cultural study of major European art movements between 1860 and 1900, including an

examination of the paintings of Manet, Monet, Renoir, Whistler, Gauguin, van Gogh, Cezanne, and Redon.

**\*183C. Modern Art: 1900-1945** (4) I. Macleod

Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Examination of modern movement in European art from Fauvism and Cubism to Surrealism and Abstract Expressionism (1900-1945). Artists studied include Picasso, Matisse, Kandinsky, Malevich, and Pollock.

**183D. Modern Sculpture** (4) II. Howard

Lecture—3 hours; term paper or gallery studies and review. Sculpture from Neo-Classicism to the present.

**\*183E. Contemporary Art: 1945 to the Present** (4)

III. Macleod

Lecture—3 hours; discussion—1 hour. Prerequisite: at least one course in art or consent of instructor. Painting and sculpture in Europe and America from 1945 to the present, with emphasis on the New York school, Pop art, Op art, Earthworks, and Feminist art.

**183F. The Tradition of Modernism** (4) I. Rogoff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 183A, 183B, 183C, or 184. Introduction to the artistic movements which traditionally constitute twentieth-century Modernism. Study will be divided into sessions dealing with formation of such avant-garde movements as Cubism and Surrealism, and sessions critically examining the emergence of individual artists as representatives of such movements.

**184. Twentieth Century Architecture** (4) III. Weiner

Lecture—3 hours; term paper. Prerequisite: 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.

**\*185. History of Art Collecting** (4) II. Howard

Lecture—3 hours; gallery study and paper. Study of the major eras, personalities, objects, theories and practices in western art collecting. Care and presentation of works of art from antiquity to the present.

**186. After Modernism: 1968** (4) II. Rogoff

Lecture—3 hours; discussion—1 hour. Prerequisite: background course in modern European history and philosophy recommended. Covers critical theory, focusing on the decade following events of 1968. Examines emergent critique of culture in relation to legacy of Frankfurt School, late structuralist thought, pop art, conceptual art, performance actions, and Fluxus movement.

**\*187. Word and Image in German Modernism** (4)

III. Rogoff

Lecture—3 hours; discussion—1 hour. Prerequisite: background course in modern European history and philosophy recommended. Covers critical theory dealing with links between visual and textual production within the alternative tradition of European modernism. Images and key texts of Expressionism, Blue Rider, Dada, Bauhaus, N.S. Fascism, Weimar Film, and Post War Restoration examined.

**188B. Architecture of the United States** (4) II.

Weiner

Lecture—3 hours; term paper. Prerequisite: course 25 recommended. American architecture from the first European settlers to Postmodernism. Technological and formal developments will be examined within the social, political, and economic context in which they emerged. Issues include ideals of domesticity and the development of the architectural profession.

**188C. Painting of the United States** (4) II. Macleod

Lecture—3 hours; discussion—1 hour; term paper or gallery studies and review. American pictorial development from 1650 to the present, with emphasis on twentieth-century developments.

**190. Undergraduate Seminar** (4) II. The Staff (Chairperson in charge)

Lecture—3 hours; term paper. Prerequisite: consent of instructor. Intended primarily for senior and junior students in the history of art. Assigned readings, discussions, and a substantial paper in a particular

area of art history will introduce the student to methodology and techniques of art historical research. May be repeated once for credit. Limited enrollment.

**192. Internship** (2-12) I, II, III. The Staff (Chairperson in charge)

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 once for credit. (P/NP grading only.)

**194H. Special Study for Honor Students** (4) I, II, III.

The Staff

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) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses**

**200. Introduction to Art Historical Research** (4) I.

The Staff

Seminar—4 hours. Introductory sampling of major writings, methods, and sources used for research in the discipline of art history.

**250. Problems in Art Historical Research** (4) III.

Howard

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.

**\*251. Seminar in Primitive Art** (4) II. Crowley

Seminar—3 hours; term paper. Selected areas of special study in the arts of Africa, Oceania, and Prehistoric Europe; in certain years, study of the Indians of the Americas, pre-Conquest to contemporary. May be repeated for credit with consent of instructor.

**\*254. Seminar in Classical Art** (4) III. Howard

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.

**\*263. Seminar in Chinese Art** (4) I. Fong

Seminar—3 hours; paper. Selected areas of special study in Chinese Art. May be repeated for credit with consent of instructor.

**265. Seminar: The Orient in Western Art** (4) II.

Fong

Seminar—3 hours; term paper. Selected topics in European and American art which demonstrates an assimilation of oriental art. May be repeated for credit with consent of instructor.

**\*276. Seminar in Medieval Art** (4) II. Grigg

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.

**\*277. Seminar in Northern Renaissance Art** (4) III.

Grigg

Seminar—3 hours; term paper. Selected areas of special study in Netherlandish and German art of the fifteenth and sixteenth centuries. May be repeated for credit with consent of instructor.

**\*278. Seminar in Italian Renaissance Art** (4) II.

Ruda

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.

**283. Seminar in Modern European Art** (4) II.

Macleod

Seminar—3 hours; term paper. Selected areas of special study in art since 1800 in Europe. May be repeated for credit with consent of instructor.

**286. After Modernism: The Eighties** (4) III. Rogoff

Seminar—3 hours; term paper. Prerequisite: course 186; course 183A, 183B, 183C, or 184 recommended. Selected areas of special study of post-structuralist critiques converging on visual production and analysis; aspects of signification and discourse, feminist critiques and gender theories, semiotics and deconstruction; works of art relating to sexual identities and images, and recuperation of painting.

**288. Seminar in European and American Architecture** (4) I. Weiner

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.

**299. Individual Study** (1-6) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

**Professional Course**

**390. Introduction to Teaching Art History for Teaching Assistants** (1) I, II, III. The Staff

Discussion—1 hour. Designed for teaching assistants with emphasis on problems and procedures encountered by teachers of undergraduate art history. (S/U grading only.)

**Professional Courses**

**\*401. Museum Training: Curatorial Principles** (4)

II. Amerson

Seminar—3 hours. 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.

**402. Museum Training: Exhibition Methods** (4) II.

Amerson

Seminar—3 hours; exhibition. 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.

**Note:** Various of the above courses are not offered each year; please check quarterly schedules.

## Art Studio

### Faculty

L. Price Amerson, Jr., Ph.D., Adjunct Lecturer  
(Director, Nelson Gallery)

Robert C. Arneson, M.F.A., hon. Ph.D. (S.F.A.I., R.I.S.D.) Professor

Squeak Carnwath, M.F.A., Associate Professor

Richard D. Cramer, M.F.A., Professor Emeritus

Roy DeForest, M.A., Professor

William Henderson, M.F.A., Professor

Harvey Himelfarb, M.A., Professor

David Hollowell, M.F.A., Assistant Professor

Ralph M. Johnson, M.A., Professor Emeritus

Manuel J. Neri, Professor Emeritus

Roland C. Petersen, M.A., Professor

Lucy A. Puls, M.F.A., Assistant Professor

Irit Rogoff, Ph.D., Assistant Professor

Cornelia Schulz, M.F.A., Professor

Wayne Thiebaud, M.A., hon. D.F.A. (C.C.A.C., D.C.) Professor

### The Major Program

Studio Art offers courses leading to the Bachelor of Arts degree. The program is composed of courses which provide knowledge and experience which are necessary to a broad understanding of the visual aspects of the humanities and provides a basis for further study and practice, leading to careers in the professions of artist, teacher and other aspects of the field of art.

**Advanced Standing.** Entering freshmen who have studied art in high school should apply for advanced standing by taking the College Board Advanced Placement Examination (AP). See the Academic Information chapter of this catalog.

**Portfolios.** Students at Davis should keep a continuing portfolio of their art work which is subject to faculty perusal at such times as when the student is declaring the major, trying to add the first day of class (the department gives preference to students who have preenrolled), requesting independent study courses, etc.

**Transfer Students.** Prior to enrolling in Art courses at Davis, ask your faculty adviser to evaluate transfer courses in art.

## A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>20</b>
Three courses from Art 2, 3, 4, 5, 16; see prerequisites required for upper division courses.....	12
Two courses from Art 1A, 1B, 1C, 1D .....	8
<b>Depth Subject Matter</b> .....	<b>36</b>
Six courses, under three different instructors, chosen from Group A, Practice of Art.....	24
One course from Group B, Theory and Criticism.....	4
Two upper division courses in art history...8	
<b>Total Units for the Major</b> .....	<b>56</b>

### Recommended

- (a) Students interested in drawing and painting should take Art 2, 3, 4 (course 5 is recommended);
- (b) Students interested in sculpture should take Art 2, 3, 5 (course 4 is recommended); and
- (c) Students preparing for graduate work in any of the environmental design professions should take Art 2, 5, 16.

**Major Advisers.** See the *Class Schedule and Room Directory*.

## Minor Program Requirements:

	UNITS
<b>Art Studio</b> .....	<b>20</b>
Upper division art studio courses chosen in consultation with a faculty adviser (one lower division substitute course permissible).....	20

Prerequisite courses must be taken prior to enrollment in upper division courses. Independent study courses are not applicable.

**Teaching Credential Subject Representative.** Department Chairperson. See also 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. Detailed information regarding graduate study may be obtained from the *Graduate Announcement* or Graduate Admissions Office.

## Courses in Art (Studio)

### Lower Division Courses

- 2. Drawing I** (4) I, II, III. Carnwath, Henderson, Schulz, and staff  
Laboratory—8 hours; to be arranged—4 hours. Form and composition in black and white. (CAN Art 8)
- 3. Drawing II** (4) I, II, III. Hollowell and staff  
Laboratory—8 hours; to be arranged—4 hours. Pre-requisite: course 2. Form and composition in color.
- 4. Life Drawing** (4) I, II, III. Hollowell, Petersen, and staff  
Laboratory—8 hours; to be arranged—4 hours. Pre-requisite: course 2. Form in composition using the human figure as subject.
- 5. Sculpture** (4) I, II, III. Puls and staff  
Laboratory—8 hours; to be arranged—4 hours. Form in space using plaster and other media. (CAN Art 12)
- 10S. Introduction to Art Appreciation:** (4) I. Hollowell  
Lecture—3 hours; term paper or gallery studies and review. Understanding and appreciation of painting.

sculpture, architecture, and industrial art. Illustrated lectures. Intended for students not specializing in art. (P/NP grading only.)

### 16. Descriptive Drawing

(4) I, II, III. Hollowell and staff  
Laboratory—8 hours; to be arranged—4 hours. Objective drawing and rendering; representations of space.

### 98. Directed Group Study

(1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. Restricted to lower division students. (P/NP grading only.)

### 99. Special Study for Undergraduates

(1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**Note :** Upper division courses are listed under three groups: (A) Practice of Art; (B) Theory and Criticism; (C) Special Study Courses.

Preenrollment in upper division courses is restricted to art majors. Art minors may obtain permission to preenroll by filling out a "Waiver of Restriction" form in the Art office.

#### Group A: Practice of Art

##### 101. Painting: Materials and Carriers

(4) I, III. Carnwath and staff  
Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 4, 5, or consent of instructor. Experimentation in media and their supports.

##### 102. Painting

(4) I, II, III. DeForest, Carnwath, and staff  
Laboratory—8 hours; to be arranged—4 hours. Pre-requisite: course 101 or consent of instructor. Advanced painting in various media including oil and polymers. May be repeated once for credit with consent of instructor.

##### 103. Advanced Drawing

(4) I. Henderson  
Laboratory—8 hours; to be arranged—4 hours. Pre-requisite: course 2, 3, 4, 16, or consent of instructor. Advanced drawing, composition and form in black and white and color. May be repeated once for credit with consent of instructor.

##### 104. Figure Drawing and Painting

(4) I, II, III. Hollowell, Schulz, and staff  
Laboratory—12 hours. Prerequisite: courses 4 and 101, or consent of instructor. Advanced figure drawing and painting using the human figure as subject. May be repeated once for credit with consent of instructor.

##### 110. Photography I

(4) I, II, III. Himefarb and staff  
Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 4, or consent of instructor. Photography as an art form. Experiments with camera and light sensitive materials.

##### 111. Photography II

(4) II. Himefarb  
Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: course 110 or consent of instructor. Art of camera and light sensitive materials: tonal control, multiple exposure, synthetic negatives, etc. May be repeated once for credit with consent of instructor.

##### 115. Film-making I

(4) III. Henderson  
Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 4, or consent of instructor. Film-making as an art form; 8 and 16 mm. cameras and sound track. May be repeated once for credit with consent of instructor.

##### \*121A. Architectural Design

(4) II. Cramer  
Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 5, 16, or compensating backgrounds in design or engineering. Small buildings as art forms, visualized in cardboard, balsa, or plaster models.

##### 125. Printmaking: Relief

(4) II. Petersen  
Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 4, 5, or consent of instructor. Woodcut, linocut, metal-plate relief and experimental uses of other materials.

##### 126. Printmaking: Intaglio

(4) II, III. The Staff  
Laboratory—8 hours; to be arranged—1 hour. Pre-

requisite: courses 2, 3, 4, 5, or consent of instructor. Metal plate etching, aquatint, hard- and soft-ground, burin engraving and related methods. May be repeated once for credit with consent of instructor.

##### 127. Printmaking: Lithography

(4) I. DeForest  
Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 4, 5, or consent of instructor. Stone and metal-plate lithography and other planographic methods. May be repeated once for credit with consent of instructor.

##### \*128. Printmaking: Serigraphy

(4) II. The Staff  
Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 4, 5, or consent of instructor. Silkscreen and related stencil methods. May be repeated once for credit with consent of instructor.

##### 141. Sculpture: Non-Metal Materials

(4) I. Puls  
Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 4, 5, or consent of instructor. Sculpture in compliant materials, e.g., wood, plaster, plastics, etc. May be repeated once for credit with consent of instructor.

##### 142. Sculpture: Ceramics I

(4) I, III. Arneson  
Laboratory—8 hours; 1 hour to be arranged. Prerequisite: course 2, 3, 4 and 5, or consent of instructor. Introduction to ceramic forms and processes.

##### 143. Sculpture: Ceramics II

(4) II. Arneson  
Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: course 142 or consent of instructor. Introduction to color, as well as glazing and use of kiln. May be repeated once for credit with consent of instructor.

##### \*144. Sculpture: Figure Modeling

(4) II. Neri  
Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2, 3, 4, 5, or consent of instructor. Sculpture in various media using the human figure as subject. May be repeated once for credit with consent of instructor.

##### 145. Sculpture: Concepts and Materials

(4) II. Puls  
Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: courses 2 and 5. Relationship between ideas and three-dimensional visual communication is explored in depth through the use of a variety of approaches and materials. May be repeated once for credit with consent of instructor.

##### 146. Sculpture: Ceramics III

(4) III. Arneson  
Laboratory—8 hours; to be arranged—1 hour. Pre-requisite: course 141, 143, 144, or 145. Advanced form and color. Clay sculpture in relief and round. May be repeated once for credit with consent of instructor.

#### Group B: Theory and Criticism

##### 147. Theory and Criticism of Photography

(4) III. Himefarb  
Lecture—3 hours; term paper. Prerequisite: course 2 or 5 and one art lecture course. Development of camera vision, ideas, and aesthetics and their relationship to the fine arts from 1839 to the present.

##### 148. Theory and Criticism: Painting and Sculpture

(4) II. Thiebaud  
Lecture—3 hours; term paper. Prerequisite: course 2 or 5, and one art lecture course. Study of forms and symbols in historic and contemporary masterpieces.

#### Group C: Special Study Courses

##### 192. Internship

(2-12) I, II, III. The Staff (Chairperson in charge)  
Internship—term paper or catalog. Supervised program of internships at professional art institutions such as museums, galleries, and art archives including collections of slides and photographs. May be repeated once for credit. (P/NP grading only.)

##### \*193. Seminar in Art Practice

(4) II. The Staff (Chairperson in charge)  
Discussion-laboratory—8 hours; variable—4 hours. Prerequisite: courses 2 and 3; upper division status taking courses in upper division drawing, painting, and sculpture. Work (painting, sculpture, drawing, etc.) done for group discussion and criticism, as well as group discussion of contemporary topics in the visual arts. Offered in odd-numbered years.

##### 198. Directed Group Study

(1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates**  
(1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

#### Graduate Courses

**201. Experiments in Art and Visual Communication** (4) I, II, III. The Staff

Lecture—3 hours. Original work produced for class discussion and criticism. May be repeated for credit.

**290. Seminar** (4) I, II, III. Carnwath, Arneson, Rogoff, Shea

Seminar—3 hours. Original works produced for group discussion and criticism; associated topics of a contemporary and historical nature. May be repeated for credit.

**291. Seminar: Critical Evaluation** (1) II. The Staff (Graduate Adviser in charge)

Seminar—1 hour. May be repeated for credit. (S/U grading only.)

**292. Seminar: Comprehensive Qualifying** (1) I.

The Staff (Graduate Adviser in charge)

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.)

**299. Individual Study** (1-6) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

**299D. Comprehensive Project** (9) III. The Staff (Graduate Adviser in charge)

An original body of work accompanied by a catalog summarizing the student's aesthetic position. May be repeated for credit. (S/U grading only.)

#### Professional Courses

**\*401. Museum Training: Curatorial Principles** (4)

II. Amerson

Seminar—3 hours; papers.† 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.

**402. Museum Training: Exhibition Methods** (4) II.

Amerson

Seminar—3 hours; exhibition.† 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.

**Note:** Various of the above courses are not offered each year; please check quarterly schedules.

requirement can be satisfied by one of the following courses in Asian-American Studies: 1, 2. (See also under University requirements.)

**Related Courses.** For courses in Asian languages, see Cantonese (below) and Chinese and Japanese. For other Asian courses, see Chinese and Japanese and East Asian Studies.

#### Minor Program Requirements:

	UNITS
<b>Asian American Studies</b> ..... 20	
Asian American Studies 100, 110 ..... 8	
An additional three courses from Asian American Studies 101, 111, 112, 130, 192 (No more than 4 units of 192 may be counted toward this total) ..... 12	

**Minor Adviser.** P.C.Y. Leung

#### Courses in Asian American Studies

*Direct questions pertaining to the following courses to the instructor or to Asian American Studies Program, 156 AOB 4 (916-752-3625).*

##### Lower Division Courses

**1. Historical Experience of Asian Americans** (4) I, II, III. The Staff

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. (Offered fall and spring quarters in even-numbered years. Offered winter quarter in odd-numbered years.)

**2. Contemporary Experience of Asian Americans**

(4) I, II, III. Kagiwada

Lecture-discussion—4 hours. Lecture—3 hours; discussion—1 hour. Introduction to Asian American Studies through analysis of relationships between ethnicity, race, and culture. Identity development of Asian Americans and their communities in the context of contemporary American institutional practices. (Offered winter quarter in even-numbered years. Offered fall and spring quarters in odd-numbered years.)

**\*20. Calligraphic Expression in Asian American Culture** (3) II. Leung

Lecture—2 hours; studio—3 hours. Survey the legacy of calligraphy in Asian American families, festivals, temples, and schools. Understanding and appreciation of calligraphy through some basic writing. Trace origins, principles and styles of Chinese and Japanese calligraphy. Offered in even-numbered years.

**92. Internship** (1-3) I, II, III. The Staff (Director in charge)

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) I, II, III. The Staff (Director in charge)

Primarily intended for lower division students. (P/NP grading only)

**99. Special Study for Undergraduates** (1-5) I, II, III

The Staff (Director in charge)  
(P/NP grading only.)

##### Upper Division Courses

**100. Asian American Communities** (4) II. Kagiwada

Lecture-discussion—4 hours. Prerequisite: course 110. Study of historical and contemporary experiences of various Asian American groups, with the community as the unit of analysis.

**\*101. Language and Educational Issues of Asian Immigrants** (4) III. Leung

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2; upper division standing. Analysis of language diversity issues in American society, especially in public schools. Overview of public policies on language and programs, particularly for Asian

language minority students. Offered in even-numbered years.

**110. Theoretical Perspectives in Asian American Studies** (4) I. Kagiwada

Lecture-discussion—4 hours. Prerequisite: course 1 or 2; upper division standing. Theories of race and ethnic relations as tools for understanding the Asian American experience with the society as the unit of analysis.

**111. Ethnic Self and Identity** (4) III. Kagiwada

Lecture-discussion—4 hours. Prerequisite: course 101. Study of cultural and social psychological influences on Asian Americans, with the individual as the unit of analysis.

**112. Asian/Pacific American Women** (4) II. The Staff

Lecture-discussion—4 hours. Prerequisite: course 1 or 2; upper division standing. Examination of the cultural, social, and political situation of Asian and Pacific American women using theoretical perspectives from social science disciplines: socialization, family dynamics, domestic and political power, economic production, and division of labor.

**130. Asian American Culture Through Literature**

(4) III. The Staff

Lecture-discussion—4 hours. Prerequisite: course 1 or 2; upper division standing. Analysis of Asian American writings as expressions of various cultural themes, psychological issues, interpersonal relationships and sociopolitical influences on the Asian American experience. Consideration of metaphor, autobiographic elements, plot, protagonist-antagonist relationships, and other literary elements.

**\*150. Filipino American Experience** (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2. 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.

**155. Legal History and the Asian American** (4) I.

The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2; consent of instructor. Role of law in American society as it affects Asian Americans. Students will study how law has been a tool of social change in Asian American communities.

**192. Internship** (1-5) I, II, III. The Staff (Director in charge)

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.)

**197. Tutoring in Asian American Studies** (1-5) I, II, III. The Staff (Director in charge)

Tutoring—1-5 hours. Prerequisite: upper division standing and completion of appropriate course with distinction; 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.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Director in charge)

Prerequisite: consent of instructor. Primarily intended for upper division students. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates**

(1-5) I, II, III. The Staff (Director in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

#### Courses in Cantonese

##### Lower Division Courses

**1-2-3. Elementary Cantonese** (5-5) I-II-III. Leung  
Lecture—3 hours; recitation—3 hours. Introduction to Cantonese grammar and development of conversational skills in a cultural context. Approximately 250

Chinese characters will be introduced during Cantonese 2 and 3. (Not open to native speakers.)

**4-5-6. Intermediate Cantonese** (3-3-3) I-II-III. Leung Lecture—2 hours; recitation—2 hours. Prerequisite: course 1-2-3 or the equivalent. Development of conversational skills in a cultural context. Community-oriented language materials in health care, social service, and bilingual education will be introduced.

## Asian Studies

See Asian American Studies; and East Asian Studies

## Astronomy

See Physics

## Atmospheric Science

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of Land, Air and Water Resources.

### The Major Program

Atmospheric Science is the study of the physics of meteorological processes, including general circulation of the atmosphere and weather systems; mass and energy transfers at the planetary surface and within the atmosphere; solar and terrestrial radiation; turbulence and diffusion; atmospheric interaction with the biosphere; climate variations; air pollution meteorology; and developments in modern meteorological instrumentation. This field is based on applied mathematical physics, and is strongly relevant to environmental biology and human ecology. Numerous career opportunities exist in the federal and state governments, research and development in the private sector, and education. Examples of career areas are agricultural meteorology, air-pollution forecasting and control, weather modification, hurricane and severe weather forecasting and research, weather satellite meteorology, and numerical weather forecasting. The course of study provides a mathematical and physical science background on which a career can be built in research, education, resource management, or various areas of direct problem solving. In addition to a broad background in meteorology, the major includes a minor area to be chosen from mathematics, computer science, environmental studies, resource management or a physical or biological science.

### B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable.)

#### UNITS

Written/Oral Expression	7-8
See College requirement	7-8
Preparatory Subject Matter	63
Biological sciences (Biological Sciences 1A, 1B)	10
Chemistry (Chemistry 1A, 1B)	10
Computer science (Engineering 5 or the equivalent in FORTRAN programming)	3
Mathematics (Mathematics 21A, 21B, 21C, 22A, 22B, 22C)	21

Meteorology (Atmospheric Science 60)	4
Physics (Physics 9A, 9B, 9C)	12
Statistics (Statistics 32)	3
<b>Breadth/General Education</b>	<b>28</b>
Satisfaction of General Education requirement	6-24
Additional units in social sciences and humanities to total 28 units†	
<b>Depth Subject Matter</b>	<b>30</b>
Atmospheric Science 110A, 110B, 120, 121A, and 121B	17
Upper division Atmospheric Science courses selected with adviser's approval	13
If both courses 105 and 133 are taken, only 4 units may be counted. No more than 3 units of courses 192 and 199 may be counted.	
<b>Restricted Electives</b>	<b>21</b>
Earth and planetary sciences (choose from Environmental Studies 116, 150A, 150B, Geography 116, 117, Geology 105, 113, 115, Resource Sciences 103, Soil Science 100, Water Science 100, 141, or courses approved by adviser)	6
Coordinated group of courses (minor area) to be chosen with adviser's approval from mathematics, computer science, environmental studies, resource management, or a physical or biological science	15
<b>Unrestricted Electives</b>	<b>30-31</b>
<b>Total Units for the Degree</b>	<b>180</b>

**Major Adviser.** R. L. Shaw (Land, Air and Water Resources).

**Advising Center** for the major, as well as for graduate studies, is located in 122 Hoagland Hall, Land, Air and Water Resources Teaching Center (916-752-1669).

**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 under the Graduate Group in Atmospheric Science. See also the Graduate Division section in this catalog.

**Related Courses.** See Environmental Studies 150A; Geography 3, 115, 116; Physics 104A, 104B; Resource Sciences 103, 131.

### Courses in Atmospheric Science

*Questions pertaining to the following courses should be directed to the instructor or to the Land, Air and Water Resources Teaching Center, 122 Hoagland Hall (916-752-1669).*

#### Lower Division Courses

**10. Severe and Unusual Weather** (3) I. Soong; III. Carroll, Weare

Lecture—2 hours; discussion—1 hour. Prerequisite: Physics 10, high school physics or the equivalent. Extreme or unusual weather events, e.g., floods, blizzards, hurricanes, tornadoes and desertification. Emphasis placed on scientific perspective and human context. Not intended for students majoring in the physical sciences. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Physics 10.

**60. Introduction to Atmospheric Science** (4) I. Shaw

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21C and Physics 9A. Introduction to atmospheric sciences for students in the natural sciences and engineering. Application of laws of physics to the atmospheric system. Introduction to atmospheric radiation, thermodynamics and dynamics. Physical basis of modern weather forecasting.

†Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.

#### 92. Atmospheric Science Internship (1-12) I, II, III.

The Staff (Chairperson in charge) Laboratory—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work-learn experience off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.)

**98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

#### Upper Division Courses

**105. Microclimate of Agricultural Systems** (3) I. Paw U

Lecture—3 hours. Prerequisite: upper division standing in biological or physical sciences. Intended for nonmajors. Energy balance, air and soil temperature, wind, water vapor, carbon dioxide patterns within the microclimate structure. Microclimate modification by windbreaks, frost protection, and other methods of energy balance manipulation. Students who have completed course 133 may receive only one unit of credit. Offered in odd-numbered years.

**110A. Weather Analysis and Forecasting** (4) III. Soong

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 121B (may be taken concurrently). Thermodynamic variables and processes, kinematic and dynamic processes and their relationship to observed weather. Laboratory work includes thermodynamic diagrams, pressure surface and vertical cross-section analyses.

**110B. Weather Analysis and Forecasting** (5) I. Carroll

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 110A, knowledge of FORTRAN (Engineering 5). Application of dynamic theory to weather systems. Special emphasis on remote sensing of weather variables, numerical weather prediction, satellite meteorology and tropical meteorology. Laboratory emphasis on the analysis and forecasting of current weather situations.

**120. Atmospheric Thermodynamics and Statics** (3) I. Weare

Lecture—3 hours. Prerequisite: Mathematics 22C; Physics 9A; course 60 (may be taken concurrently). Atmosphere at rest; atmospheric composition and structure, thermodynamics of atmospheric gases, thermal properties of dry and moist air, hydrostatic equilibrium and stability criteria, and thermodynamic diagrams in meteorology.

**121A. Atmospheric Dynamics** (3) II. Nathan

Lecture—3 hours. Prerequisite: course 120; Mathematics 22C; Physics 9B. The atmosphere in motion: equations of motion for rotating atmospheres; pressure and density fields and their relations to atmospheric circulations; wave motion in the atmosphere; vorticity. The physical basis of modern numerical methods in meteorology.

**121B. Atmospheric Dynamics** (3) III. Nathan

Lecture—3 hours. Prerequisite: course 121A. The dynamics of fluid motion in geophysical and laboratory systems: Rossby waves; Helmholtz waves; the effect of turbulence; boundary layers; the Ekman layer. The dynamics of convective motion: the Rayleigh problem; penetrative convection; convective plumes; cumulus models.

**124. Meteorological Instruments and Observations** (3) I. Paw U

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 60; Physics 9C. Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micrometeorological instruments are included. Offered in odd-numbered years.

**128. Radiation and Satellite Meteorology** (3) II. Weare

Lecture—3 hours. Prerequisite: course 60; Physics 9B (may be taken concurrently); Mathematics 22B,

22C. 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 winds.

**133. Biometeorology (4) II. The Staff**

Lecture—3 hours; discussion—1 hour. Prerequisite: two courses in a biological discipline; Mathematics 16B. Atmospheric and biological interactions. Physical basis for plant, animal and human response and adaptation to short-term and long-term meteorological events. Students who have completed course 105 may receive only two units of credit.

**149. Introduction to Air Pollution (3) I. Carroll, Chang, Raabe (Civil Engineering)**

Lecture—3 hours. Prerequisite: Mathematics 22B, 22C; Chemistry 1B; course 121A or Engineering 103A. Examination of 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 Engineering 149.)

**150. Numerical Weather Prediction (4) II. Grotjahn**  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 121B and Engineering 5. Numerical techniques and their applications to meteorological problems. Finite differencing and spectral methods, design of forecast models, parameterization of physical processes and predictability. Written computer programs to illustrate these topics.

**158. Boundary-Layer Meteorology (4) III. Shaw**  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 121A. Growth, development and structure of the atmospheric layer directly influenced by the underlying surface and extending to a maximum of about two kilometers under convective conditions. Turbulent diffusion in the boundary layer. The microclimate at and near the ground surface.

**192. Atmospheric Science Internship (1-12) I, II, III. The Staff (Chairperson in charge)**  
Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learn experience off and on campus in atmospheric science. Internship supervised by a member of the faculty. (P/NP grading only.)

**198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**  
Prerequisite: three upper division units in Atmospheric Science. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)**  
Prerequisite: three upper division units in Atmospheric Science and at least an overall B average. (P/NP grading only.)

**Graduate Courses**

**200. Atmospheric Processes (3) I. The Staff**

Lecture—3 hours. Prerequisite: Mathematics 22B-22C; Physics 9B. Advanced phenomenological and physical study of atmospheric structure and processes including radiation, statics, thermal structure and weather phenomena. Accelerated presentation of the major topics covered in courses 60, 110A-110B, 120, and 128. Credit not allowed to students having completed any two of these courses.

**210. Atmospheric Physics (3) III. The Staff**

Lecture—3 hours. Prerequisite: course 121A (may be concurrent). Selective introduction to the physical processes within the atmosphere. Emphasis will be given to radiative transfer and remote sensing, global atmospheric chemistry, and the physical and dynamic processes in the upper atmosphere.

**221. Advanced Atmospheric Dynamics (3) III. Grotjahn**

Lecture—3 hours. Prerequisite: courses 121B and 240. Emphasis on recent theoretical work in dynamic meteorology. Derivations of filtered equations from the primitive equations; potential vorticity and other conservation laws; linear barotropic and baroclinic instability theory; nonlinear wave-interaction; wave-cyclone life cycles; and related topics. Offered in even-numbered years.

**223. Advanced Boundary-Layer Meteorology (3) III. Shaw**

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 even-numbered years.

**230. Atmospheric Turbulence (3) II. Shaw**

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 even-numbered years.

**231. Advanced Air Pollution Meteorology (3) II. Carroll**

Lecture—3 hours. Prerequisite: course 149, and one course in fluid dynamics. Processes determining transport and diffusion of primary and secondary pollutants. Models of turbulence, of the atmospheric boundary layer and of mesoscale wind fields, as applicable to pollutant dispersion problems are examined. Offered in odd-numbered years.

**\*233. Topics in Advanced Biometeorology (3) II. Paw U**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 133 or consent of instructor. Study of current topics in biometeorology focusing on interactions of plants with the weather. Biological energy budgets and adaptations to changes in energy regime. Quantification of weather parameters for optimum biological response. Offered in odd-numbered years.

**240. General Circulation of the Atmosphere (3) I. Grotjahn**

Lecture—3 hours. Prerequisite: course 121B. Large-scale, observed atmospheric circulations. Energy and momentum balances derived and compared with observations. Theoretical framework developed to synthesize observed features.

**241. Climate Dynamics ((3) III. Weare**

Lecture—3 hours. Prerequisite: courses 120, 121A, 121B or the equivalent; Applied Science Engineering 115 or the equivalent computer programming experience; course 150 recommended. Dynamics of climatic variations. Global and zonal average energy balance models. Parameterizations of radiative transfer, convection, and ocean circulation. Introduction to primitive equation climate models. Offered in even-numbered years.

**250. Meso-Scale Meteorology (3) II. Soong**

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 odd-numbered years.

**270A-G. Topics In Atmospheric Science (1-3) I, II, III. The Staff**

Discussion—1-3 hours. Applications and concepts in (A) Meteorological Statistics; (B) Computer Modeling of the Atmosphere; (C) Design of Experiments and Field Studies in Meteorology; (D) Solar and Infrared Radiation in the Atmosphere; (E) Aerosol and Cloud Physics; (F) Atmospheric Chemistry; (G) General Meteorology.

**290. Seminar (1) I, III. The Staff (Chairperson in charge)**

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.)

**291A-D. Research Conference in Atmospheric Science (1) I, II, III. The Staff**

Discussion—1 hour. Review and discussion of current literature in: (A) Air Quality Meteorology; (B)

Biometeorology; (C) Boundary Layer Meteorology; (D) Climate Dynamics. May be repeated up to a total of 5 units per segment. (S/U grading only.)

**298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

**299. Research (1-12) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

## Atmospheric Science (A Graduate Group)

Richard D. Grotjahn, Ph.D., Chairperson of the Group (916-752-2246)

Group Office, 151 Hoagland Hall (916-752-1406)

**Faculty.** Includes nineteen faculty members from the Departments of Land, Air and Water Resources, Agricultural Engineering, Civil Engineering, Geography, Physics, the Laboratory for Energy-Related Health Research, and the Division of Environmental Studies.

**Graduate Study.** The Graduate Group in Atmospheric Science offers both the M.S. and Ph.D. degree programs. The student can place major emphasis on graduate work in one or more of the following fields: air quality meteorology, biometeorology, boundary-layer meteorology, climate dynamics, large scale dynamics, and mesoscale 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. Considerable 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.** S.T. Soong (Land, Air and Water Resources, 752-6151).

**Graduate Admissions Officer.** T.R. Nathan (Land, Air and Water Resources, 752-1609).

## Avian Medicine

### See Epidemiology and Preventive Medicine

## Avian Sciences

(College of Agricultural and Environmental Sciences)

Hans Abplanalp, Ph.D., Chairperson of the Department

Department Office, 3202 Meyer Hall (916-752-1300)

**Faculty**

Ursula K. Abbott, Ph.D., Professor

Hans Abplanalp, Ph.D., Professor

Francine A. Bradley, Ph.D., Lecturer

Ralph A. Ernst, Ph.D., Lecturer

C. Richard Grau, Ph.D., Professor Emeritus

Annie J. King, Ph.D., Assistant Professor

Kirk C. Klasing, Ph.D., Associate Professor  
 F. Howard Kratzer, Ph.D., Professor Emeritus  
 James R. Millam, Ph.D., Associate Professor  
 Frank X. Ogasawara, Ph.D., Professor Emeritus  
 Kathryn Radke, Ph.D., Assistant Professor  
 Pran N. Vohra, Ph.D., Professor Emeritus  
 2<sup>3</sup> Wesley W. Weathers, Ph.D., Professor  
 Barry W. Wilson, Ph.D., Professor  
 Wilbor O. Wilson, Ph.D., Professor Emeritus

## The Major Program

Avian Sciences is the study of birds and the ways in which they relate to and are useful to humans. The major provides a balanced program if your interest is in birds—including the study of avian wildlife and their environments, production and marketing of domestic birds and eggs, caged exotic bird management, and basic and applied laboratory research on birds—and a broad knowledge of biological science. You may seek a career in health-oriented research, the teaching of biology, gamebird production, domestic and foreign agricultural extension and advisory services, governmental agencies or a diversified and progressive poultry industry. The flexibility of the program and the close personal interaction between students, faculty, and specialists in the field permit you to play a large role in selecting and designing your own course work. You may specialize in a bachelor's program that qualifies you for a particular job; or you may choose a program to meet other broader intellectual and cultural interests. Independent study, undergraduate research, and work-learn experiences are features emphasized in the program.

## B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equal or more comprehensive courses are acceptable.)

	UNITS
<b>Written/Oral Expression</b> .....	<b>7-8</b>
See College requirement .....	7-8
<b>Preparatory Subject Matter</b> .....	<b>53-54</b>
Avian sciences (Avian Sciences 11 or 13) .....	3-4
Biological sciences (Biological Sciences 1A, 1B, 1C) .....	15
Chemistry (Chemistry 1A, 1B, 8A, 8B) .....	16
Computer science (Agricultural Science and Management 21) .....	3
Mathematics (Mathematics 16A, 16B) .....	6
Physics (Physics 1A and 1B) .....	6
Statistics (Statistics 13) .....	4
<b>Breadth Subject Matter</b> .....	<b>24</b>
Satisfaction of General Education requirement .....	24
<b>Depth Subject Matter</b> .....	<b>49</b>
Physiological chemistry or biochemistry (Physiological Sciences 101A-101B or Biochemistry 101A-101B) .....	6
Genetics (Genetics 100) .....	4
Nutrition (Avian Sciences 150-150L or Nutrition 110) .....	5
Physiology (Physiology 110) .....	5
Laboratory units in above listed subjects .....	4
(Recommended courses include Animal Science 135, Avian Sciences 150L, Biochemistry 101L, or Physiology 110L)	
Specialized courses related to avian species .....	25
<b>Restricted Electives</b> .....	<b>27</b>
To supplement or expand depth subject matter courses	
<b>Unrestricted Electives‡</b> .....	<b>18-20</b>
<b>Total Units for the Degree</b> .....	<b>180</b>

**Major Adviser.** A.J. King.

‡A student may take one quarter of work-learn experience for a maximum of 12 units.

**Advising Center** for the major is located in 3202 Meyer Hall (916-752-1300).

**Graduate Study.** Further training is available through graduate or professional programs in animal physiology, genetics, nutrition, or veterinary medicine. The M.S. degree is offered in Avian Sciences. For details see under the Graduate Group in Avian Sciences. See also the Graduate Division section in this catalog.

**Related Courses.** See Agricultural Economics 130; Food Science and Technology 120, 120L, 121; International Agricultural Development 102; Nutrition 123; Physiology 117; Zoology 100, 100L.

## Courses in Avian Sciences

### Lower Division Courses

**11. Introduction to Poultry Science** (3) II. Bradley 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. General Education credit: Nature and Environment/Introductory.

**11L. Laboratory in Avian Sciences** (1) II. Bradley Laboratory—3 hours. Prerequisite: course 11 (may be taken concurrently). Demonstrations, laboratory exercises and two Saturday field trips; management, anatomy, reproduction, egg incubation, nutrition, health and welfare of domestic birds; data collection techniques.

**13. Birds, Humans, and the Environment** (4) III. Wilson

Lecture—2 hours; discussion—1 hour; laboratory—2 hours. Prerequisite: course in biology recommended. Relations among birds, humans and their environment. Emphasis on ecology; includes avian evolution and biology, flight, behavior, domestication, agriculture, folklore, art, pollution, and conservation. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10.

**92. Internship in the Avian Sciences** (1-12) I, II, III. The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: sophomore standing preferred; consent of instructor. Work-learn study on and off campus in poultry, gamebirds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval Request form essential. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Problems in avian biology; nutrition, breeding, and physiology of poultry/wild birds and their products. (P/NP grading only.)

### Upper Division Courses

**100. Principles of Avian Sciences** (5) II. The Staff Lecture—4 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A. Aspects of biology (anatomy, physiology, behavior, nutrition, reproduction and genetics) that govern the life of birds. Emphasis on those features of birds, domestic, wild and experimental, which are distinctive.

**\*101. Patterns in Avian Biology** (3) I. Weathers Lecture—3 hours. Prerequisite: Biological Sciences 1B or the equivalent. Patterns of reproduction, locomotion, foraging, growth and development, energetics, and temperature regulation exhibited by birds. Ecological and evolutionary adaptations and allometric analysis of life history traits.

**102. Fertility and Hatchability** (4) III. Abbott

Lecture—2 hours; discussion—1 hour; laboratory—3 hours; one field trip; report. Prerequisite: course 100; Genetics 100; Zoology 100. Analysis of normal avian embryonic development and reproductive failures resulting from nutritional, genetic, and environmental problems. Exploration of the use of avian embryos in research on drugs, pesticides, and other contaminants, and in biomedical research.

**115. Raptor Biology** (3) I. Morzenti

Lecture—3 hours. Prerequisite: Biological Sciences

1A 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.

**123. Management of Birds** (4) III. Millam

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100. Captive management of birds will be studied by focusing on four major avian groups: ducks, parrots, pheasants, and pigeons. Management practices will be studied in relation to differences in avian physiology and human culture.

**130. Poultry Breeding and Genetics** (3) I. Abplanalp

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 100. Applications of genetic principles in poultry. Action of major genes in the control of morphology, reproduction and disease resistance. Breeding plans and genetic tests for major genes as well as traits with quantitative inheritance.

**149. Advanced Poultry Management** (4) III. Ernst

Lecture—3 hours; discussion—1 hour. Prerequisite: course 11 or Animal Science 2, or the equivalent. Environmental management of poultry: brooding; disease prevention; recycling; lighting programs; housing design; egg, broiler, and turkey production; breeding flock care; and hatchery management. Offered in odd-numbered years.

**150. Nutrition of Birds** (3) II. Klasing

Lecture—3 hours. Prerequisite: Physiological Sciences 101B (may be taken concurrently) or Biochemistry 101B; course 100. Comparison of digestive tracts, food habits, effects of nutrients on growth, sexual maturity, egg production, fertility and hatchability of eggs of wild and domestic species of birds. Effects of pesticides and other non-nutrient substances on their life cycles.

**150L. Nutrition of Birds Laboratory** (2) III. King

Laboratory—6 hours. Prerequisite: course 150. Feeding trials to show nutrient requirements. Metabolizable energy study and proximate analysis of feed. Determination of vitamins, minerals, fatty acids and other nutrients or substances in feed with emphasis on use of laboratory equipment.

**190. Seminar in Avian Sciences** (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: upper division standing in Avian Sciences and consent of instructor. May be repeated three times for credit. (P/NP grading only.)

**192. Internship in Avian Sciences** (1-12) I, II, III. The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: completion of a minimum of 84 units; consent of instructor. Work-learn study on and off campus in poultry, gamebirds or exotic bird production, management and research; or in a business, industry, or agency concerned with these entities. Compliance with Internship Approval Request form essential. (P/NP grading only.)

**195. Topics in Current Research** (1-3) I, II, III. The Staff (Chairperson in charge)

Lecture-discussion—variable. Hours will depend on instructor with the number of units being commensurate with time in class. Prerequisite: consent of instructor. Discussion of topics of current interest in avian sciences. May be repeated three times for credit.

**197. Tutoring in Avian Sciences** (1-3) I, II, III. The Staff (Chairperson in charge)

Hours and duties vary depending upon course being tutored. Prerequisite: Avian Sciences or related major; advanced standing; consent of instructor. Tutoring of students in lower division avian sciences courses; weekly conference with instructors in charge of course; written critiques of teaching procedures. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

#### Graduate Courses

**202. Laboratory in Avian Experimental Embryology and Teratology** (4) III. Abbott

Laboratory—twenty-nine consecutive 3 1/2-hour days, plus 6 equal sessions—to be arranged. Prerequisite: consent of instructor. Causes of abnormal morphogenesis in avian embryos including genetic, chemical, and physical-environmental factors; the application of transplantation, organ culture, and other experimental techniques. Offered in even-numbered years.

**220. Cellular Proliferation and Oncogenes** (4) III.

Radke

Lecture—3 hours; term paper. Prerequisite: Biochemistry 101B, Zoology 121A-121B, Genetics 102B. Regulation of growth and division of animal cells. Oncogenes, retroviruses and growth factors will be discussed in the context of normal and cancerous growth. Critical reading and writing are stressed.

**230. Avian Endocrinology** (2) II. Millam

Lecture—2 hours. Prerequisite: course work in endocrinology, avian biology or reproductive physiology. Examination of current issues in avian endocrinology with emphasis on endocrine aspects of reproductive physiology. Offered in even-numbered years.

**250. Advanced Poultry Nutrition** (3) III. Klasing

Lecture—2 hours; discussion—1 hour. Prerequisite: Nutrition 110. Metabolic basis for nutrient requirements in avian species including energy, amino acids, vitamins, and minerals. Discussions on design and analysis of nutrition trials, hormonal control of metabolism, nutritional and metabolic control of nutrient partitioning and gene expression. Offered in even-numbered years.

**\*260. Topics in Avian Physiological Ecology** (2) I.

Weathers

Lecture—1 hour; seminar—1 hour. Prerequisite: course 100; Physiology 110 or Physiological Sciences 101A-101B; senior or graduate standing. Energy and water requirements of captive and free-living birds. Metabolic requirements for growth, maintenance, reproduction, and thermoregulation. Emphasis given to diversity of patterns found in birds and their ecological correlates. Offered in odd-numbered years.

**290. Seminar** (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Reports and discussions of recent advances and selected topics of current interest in avian genetics, physiology, nutrition, and poultry technology.

**290C. Research Conference** (1) I, II, III. The Staff

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.)

**297T. Supervised Teaching in Avian Sciences** (1-4) I, II, III. The Staff (Chairperson in charge)

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.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor.

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (S/U grading only.)

## Avian Sciences (A Graduate Group)

Hans Abplanalp, Ph.D., Chairperson of the Group  
Group Office, 3202 Meyer Hall (916-752-1300)

**Faculty.** Consists of members from several departments in the College of Agricultural and Environmental Sciences and the School of Veterinary Medicine.

**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. The areas of specialization that may be chosen by the student at present include: nutrition, physiology, reproduction, pathology, toxicology, food products, 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.** It is expected that the student will have had undergraduate preparation in a field appropriate to the course of study selected. The student will be expected to have had courses in most of the following subjects: general biology, general and organic chemistry, biochemistry, avian biology, genetics, nutrition, physiology, and statistics.

**Graduate Adviser.** K.C. Klasing (*Avian Sciences*).

## Bacteriology

### See Microbiology

## Biochemistry

(College of Agricultural and Environmental Sciences)

### The Major Program

The Biochemistry 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. Because the program focuses on the molecular basis of life processes, it is suitable for students interested in pursuing graduate studies or professional careers in a wide variety of contemporary biological sciences. These include basic research (e.g., biochemistry, cell biology, molecular genetics, biotechnology, human or veterinary medicine and dentistry, and biology-chemistry teaching). Students who enjoy both chemistry and biology and who are comfortable with quantitative approaches to problem solving will find biochemistry a fruitful field of study.

#### Choice of College.

The Bachelor of Science degree is offered by both the College of Agricultural and Environmental Sciences and the College of Letters and Science. Students majoring in Biochemistry in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis. Students in the College of Agricultural and Environmental Sciences must accumulate 54 units of upper division courses to graduate. Further information can be obtained from the Division of Biological Sciences Office, 376 Mrak Hall.

### B.S. Major Requirements:

UNITS

**Written/Oral Expression** ..... 7-8  
College of Agricultural and Environmental Sciences students only ..... 7-8

**Preparatory Subject Matter** ..... 59-66

Biological sciences (Biological Sciences 1A, 1B, 1C) ..... 15

Chemistry (Chemistry 1A-1B-1C, 5; or 4A-4B-4C (students may start with Chemistry 4A and continue with 1B-1C but not vice versa)) ..... 15-19

Mathematics (Mathematics 16A-16B-16C or 21A-21B-21C) ..... 13-16

Physics, 12 units minimum (Physics 6A-6B-6C or 8A-8B-8C)† ..... 12

Statistics (Statistics 13, 102, or 130A) ..... 4

**Depth Subject Matter** ..... 40

Biochemistry 101A-101B, 101L ..... 12

Genetics 100 ..... 4

Organic chemistry: Chemistry 128A-128B-128C, 129A-129B-129C ..... 15

Physical chemistry: Chemistry 107A-107B-108 or 110A-110B-110C ..... 9

**Breadth/General Education** ..... 6-24

College of Letters and Science students:

Refer to the College section for a description of the options available in meeting this requirement.

**Restricted Electives** ..... 15

Upper division courses in biochemistry and related areas, to include at least three courses from Biochemistry 122, 133, 143, 153, and at least one additional lecture or laboratory course in a biological science other than biochemistry.

No more than 3 units of courses numbered 192, 197T, 198 or 199 may be used (check with adviser).

**Unrestricted Electives** to bring total to 180 units

**Total Units for the Major** ..... 180

**Major Adviser.** L.R. Sprechman (*Biochemistry and Biophysics*), 126 Briggs Hall.

**Advising Center** for the major is located in 149 Briggs (916-752-9032).

**Graduate Study.** See Biochemistry (A Graduate Group); and the Graduate Division section in this catalog.

**Courses.** See under Biochemistry and Biophysics.

## Biochemistry (A Graduate Group)

Harry R. Matthews, Ph.D., Chairperson of the Group  
Group Office, 149 Briggs Hall (916-752-9031)

**Graduate Study.** The Graduate Group in Biochemistry offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding graduate study, address the chairperson of the group.

**Graduate Advisers.** M.E. Dahmus (*Biochemistry and Biophysics*), J.C. Lagarias (*Biochemistry and Biophysics*), M.R. Villarejo (*Biochemistry and Biophysics*).

### Courses in Biochemistry

#### Graduate Courses

**290. Seminar** (1) I, II, III. The Staff  
Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)

†Physics 8D is optional. Students electing the Physics 8 sequence should elect Mathematics 21A-21B-21C and 22A-22B-22C.

**299. Research** (1-12) I, II, III. The Staff  
(S/U grading only.)

## Biochemistry and Biophysics

(College of Agricultural and Environmental Sciences)

Don M. Carlson, Ph.D., Chairperson of the Department

Department Office, 149 Briggs Hall (916-752-3611)

### Faculty

Judy Callis, Ph.D., Assistant Professor

Don M. Carlson, Ph.D., Professor

Sterling Chaykin, Ph.D., Professor

Eric E. Conn, Ph.D., Professor

Richard S. Criddle, Ph.D., Professor

Michael E. Dahmus, Ph.D., Professor

Roy H. Doi, Ph.D., Professor

Marilynn E. Etzler, Ph.D., Professor

Charles S. Gasser, Ph.D., Assistant Professor

Jerry L. Hedrick, Ph.D., Professor

Lloyd L. Ingraham, Ph.D., Professor Emeritus

Eric B. Kmiec, Ph.D., Assistant Professor

J. Clark Lagarias, Ph.D., Associate Professor

R. Marc Learned, Ph.D., Assistant Professor

Mark G. McNamee, Ph.D., Professor

Irwin H. Segel, Ph.D., Professor

Larry R. Sprechman, Ph.D., Lecturer, S.O.E.

Paul K. Stumpf, Ph.D., Professor Emeritus

Merna R. Villarejo, Ph.D., Professor

**Major Programs and Graduate Study.** See the major in Biochemistry and for graduate study see Biochemistry (A Graduate Group) and the Graduate Division section in this catalog.

**Related Courses.** See Food Science and Technology 210, 250, 250L.

## Courses in Biochemistry and Biophysics

Questions pertaining to the following courses should be directed to the instructor.

### Upper Division Courses

**101A. General Biochemistry** (3) I, II, III. Criddle, Etzler, Hilt, Kmiec, McNamee, Sprechman  
Lecture—3 hours. Prerequisite: Chemistry 8B or 128B. Introduction to the chemistry and metabolism of biologically important compounds; dynamic aspects of biochemistry with examples from animals, plants and microorganisms.

**101B. General Biochemistry** (3) I, II, III. Carlson, Conn, Segel, Sprechman  
Lecture—3 hours. Prerequisite: course 101A. Continuation of 101A.

**101L. General Biochemistry Laboratory** (6) I, II, III. Chaykin, Hilt, Lagarias, McNamee, Sprechman  
Lecture—3 hours; laboratory—9 hours. Prerequisite: course 101B (may be taken concurrently); Chemistry 5. Introduction to laboratory methods and procedures employed in studying biochemical processes. Designed for students who need experience in the use of biochemical techniques as laboratory tools.

**102L. Advanced Undergraduate Laboratory** (4) III. Sprechman  
Lecture—2 hours; laboratory—7 hours. Prerequisite: course 101L and consent of instructor. Advanced biochemical laboratory methods and procedures including some of the more recent technological advances. Experiments include techniques from areas such as immunochemistry, nucleic acid manipulation and sequencing, high performance liquid chromatography, and membrane biochemistry.

**122. Plant Biochemistry** (3) II. Conn, Lagarias  
Lecture—3 hours. Prerequisite: course 101B. The chemistry of important plant constituents and processes such as photosynthesis and respiration; carbohydrate, fat, and nitrogen metabolism.

**123. An Introduction to Enzymology** (3) III. Whitaker  
Lecture—3 hours. Prerequisite: course 101B. Principles of physical, chemical and catalytic properties of enzymes and their utilization. Experimental determination and quantitative evaluation of influence of reaction conditions on activity are stressed. Specificity and mechanism of action illustrated by consideration of selected enzymes.

**123L. Enzymology Laboratory** (2) III. Whitaker  
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 101B; course 123 (concurrently). Laboratory procedures involved in separation and study of enzymes.

**133. Behavior and Analysis of Enzyme Systems** (3) III. Segel

Lecture—3 hours. Prerequisite: course 101B. Introduction to enzyme kinetics and receptor-ligand interactions with emphasis on metabolic regulation and data analysis. Topics include steady-state kinetics, patterns of feedback inhibition, control by enzyme activity, allosteric enzymes, multireactant systems, enzyme assays, and membrane transport.

**143. Structure-Function Relations of Proteins** (3)

I. Criddle, Hedrick

Lecture—3 hours. Prerequisite: courses 101A, 101B; and 101L (may be taken concurrently). Correlation of structure and biological function. Molecular models of enzymes that explain their physiological functioning. Physical and chemical methods used in determining protein structure. Function as measured by kinetic and binding models and as affected by physiological considerations.

**153. Molecular Biology of Eukaryotic Cells** (3) II. Dahmus

Lecture—3 hours. Prerequisite: course 101B and 101L; Genetics 100. Structure, expression and regulation of eukaryotic genes. Chromosome structure and replication; gene structure, transcription and RNA processing; protein synthesis and translational control; development, immune system and oncogenes.

**190. Undergraduate Seminar in Biochemistry** (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: courses 101A, 101B (may be taken concurrently). Discussion of the historical developments of modern biochemistry.

**192. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: consent of instructor. Technical and/or practical experience on and off campus, supervised by a member of the Biochemistry and Biophysics faculty. (P/NP grading only.)

**194H. Biochemistry Honors** (1-5) I, II, III. The Staff  
Prerequisite: 4 units of course 199 with faculty director; senior standing; grade-point average of at least 3.25; consent of department. Honors project in Biochemistry. Laboratory research on a biochemical problem followed by presentation of the work in a written thesis and in a seminar. (P/NP grading only.)

**197T. Tutoring in Biochemistry** (1-5) I, II, III. The Staff (Chairperson in charge)

Discussion—1-5 hours. Prerequisite: upper division standing and consent of instructor. To assist the instructor by tutoring students in one of the department's regular courses. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

**201A. Physical and Chemical Biochemistry** (4) I.

Benisek (Biological Chemistry), Criddle, Lagarias, Matthews (Biological Chemistry), Segel, Troy (Biological Chemistry)

Lecture—4 hours. Prerequisite: course 101B; Chemistry 107B-108 or 110C; 128C, 129C. Biochemical thermodynamics and chemical and physical proper-

ties of biomacromolecules, including enzyme kinetics and methods for determining size and shape of macromolecules.

**201B. Integration of Metabolism and Regulatory Phenomena** (3) II. Learned

Lecture—3 hours. Prerequisite: course 201A or consent of instructor. Regulatory phenomena that occur in control of metabolism; e.g., regulation at enzyme level; integration of metabolic pathways including homeostasis, hormonal influences, turnover of enzymes, comparative aspects of metabolism, regulation of amino acids and lipid metabolism in living systems. Offered in odd-numbered years.

**201C. Molecular Biology** (3) III. Bradbury (Biological Chemistry), Dahmus, Doi, Hershey (Biological Chemistry)

Lecture—3 hours. Prerequisite: course 201A. Structure and organization of DNA and chromatin; DNA replication, repair and modification; transcription and RNA processing; protein biosynthesis and turnover; transcriptional and post-transcriptional control mechanisms; examples of the above from eukaryotic and prokaryotic cells, and viruses.

**201D. Cellular Biochemistry** (3) I. Etzler, McNamee, Traut (Biological Chemistry), Troy (Biological Chemistry)

Lecture—3 hours. Prerequisite: course 201A. Structure and function of cell membranes and cell surface components with emphasis on biochemical principles involved in cell growth, cell development and cell-cell interactions. Biochemical aspects of some differentiated systems, such as the immune system.

**202A-202B. Advanced Biochemical Methods** (1-1) I-II. Hedrick

Lecture—1 hour. Prerequisite: course 201A (may be taken concurrently), and 101L or the equivalent. Laboratory methods and procedures used in biochemical research.

**202L. Advanced Biochemistry Laboratory** (5) I, II, III. The Staff

Laboratory—15 hours. Prerequisite: course 201A (may be taken concurrently), and 101L or the equivalent. Two five-week assignments in biochemistry research laboratories. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated twice for credit.

**\*203. Carbohydrates** (3) III.

Lecture—2 hours. Prerequisite: course 201B. Chemistry, metabolism, and biological functions of the various classes of carbohydrates and their polymers. Biosynthesis of simple and complex sugars and polysaccharides. Offered in even-numbered years.

**204. Gene Expression** (3) III. Kmiec

Lecture—3 hours. Prerequisite: course 153 or 201C. Examination of current working hypotheses on the mechanism of gene expression on transcription. Transcription factors, cis-acting elements and regulatory domains will be examined in detail with a special emphasis on eukaryotic systems.

**\*205. Biochemical Mechanisms** (3) II. The Staff

Lecture—3 hours. Prerequisite: course 101B or consent of instructor; Chemistry 110C, 131. Bond structures of biochemical interest. Application of modern organic and inorganic chemical principles to a study of the mechanisms of biochemical reactions.

**208. Membrane Biochemistry** (2) II. McNamee, Villarejo

Lecture—2 hours. Prerequisite: course 201D. Advanced topics in membrane biochemistry with emphasis on the structure and function of membrane proteins and lipids. Offered in even-numbered years.

**212. Chemical Modifications of Proteins** (3) II.

Benisek (Biological Chemistry)

Lecture—3 hours. Prerequisite: course 101B; Chemistry 128C. Chemical approaches for studying proteins, emphasizing the use of chemical modifications as a tool in the study of active sites, particularly of enzymes, and relating the structure of proteins to their functions. Offered in even-numbered years.

**\*215. Kinetics of Biological Systems (2) III. The Staff**

Lecture—2 hours. Prerequisite: courses 201A, 201B; FORTRAN IV (may be taken concurrently). Kinetic behavior of multivariable biological systems; mathematical methods and analysis of typical data with accent on computer use; in particular, the kinetics of multivariate catalysts, pre-steady state systems, perturbed systems, and reactions in a metabolic sequence. Offered in even-numbered years.

**250. Biochemical Literature (1) I, II, III. The Staff**

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Critical reading and evaluation of current biochemical literature. Selected papers will be presented and discussed in detail. (S/U grading only.)

**270. Advanced Research Conference (1) I, II, III. The Staff (Chairperson in charge)**

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Presentation and critical discussions of research activities of various members of local biochemical community; primarily designed for graduate students. (S/U grading only.)

**291. Current Progress in Biochemistry (1) I, II, III. The Staff (Chairperson in charge)**

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Seminars presented by guest lecturers on subject of their own research activities. (S/U grading only.)

**298. Group Study (1-5) I, II, III. The Staff**

Prerequisite: consent of instructor. (S/U grading only.)

**299. Research (1-12) I, II, III. The Staff (S/U grading only.)****Professional Course****390. The Teaching of Biochemistry (1) I, II, III. The Staff (Chairperson in charge)**

Discussion—1 hour. Prerequisite: graduate student in Biochemistry; consent of instructor. Practical experience in methods and problems of teaching biochemistry. Includes analyses of texts and supporting material, discussion of teaching techniques, preparing for and conducting discussion sessions, observing and guiding student laboratory work, formulation of topics and questions for examinations under supervision of instructor. Participation in the teaching program required for Ph.D. degree. May be repeated for credit. (S/U grading only.)

**Programs of Study**

The Division of Biological Sciences is an intercollege unit which coordinates the teaching and research of the departments of Animal Physiology, Biochemistry and Biophysics, Botany, Genetics, Microbiology, and Zoology. Four majors leading to an A.B. degree are offered in Biological Sciences, Botany, Microbiology, and Zoology. Seven majors are offered within the Division leading to a B.S. degree in disciplines of the six above-named departments, and in Biological Sciences. The major programs are described under the respective departmental listings, except for the majors in Biological Sciences (outlined below).

**The Major Programs**

The major programs in Biological Sciences provide an opportunity for broader study of basic biology than is possible with most departmental majors. The programs provide suitable undergraduate preparation for a wide variety of careers, including teaching, biological research, work with various governmental agencies or with private companies, and all the health sciences. Students interested in a career involving considerable personal interactions, such as some of the health science areas, may be best served by the Bachelor of Arts program; for those interested in a more laboratory-oriented area, the Bachelor of Science program is more suitable.

Students majoring in Biological Sciences in the *College of Letters and Science* may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

**Choice of College.** The Bachelor of Arts degree is offered only by the College of Letters and Science. The Bachelor of Science degree is offered by both the College of Letters and Science and the College of Agricultural and Environmental Sciences.

**A.B. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter</b>	<b>37-42</b>
Biological Sciences 1A-1B-1C	15
Chemistry 1A-1B	10
Chemistry 8A-8B or 128A-128B-128C-129A	6-11
Mathematics and/or statistics	6
Recommended: Chemistry 1C; Physics 5A, 5B, 5C; a course in computer programming.	

**Note:** A course in computer programming may be acceptable toward satisfaction of the mathematics/statistics requirement with prior approval from the Dean.

**Depth Subject Matter**

Genetics 100	4
Restricted Electives	32

Upper division biological sciences courses to include:

(1) a minimum of 2 units or 6 (quarter) hours of laboratory classes,

(2) at least 3 units from each of the three Area Requirements: animal biology, microbiology, and plant biology (see "Course List for Area Requirement" section following the B.S. major requirements. The lists apply to both the A.B. and B.S. majors.), and

(3) at least one course from each of the five Group Requirement lists, (a) through (e) following.

**Note:** A course that appears on both the Area and Group Requirement lists may be used toward satisfying both requirements. Both halves of sequential courses connected by a hyphen must be taken.

**Course List for Group Requirement**

(a) *Organismal biology:* Botany 102, 105, 108, 114, 118, 119; Entomology 101, 102, 103; Microbiology 105, 162; Veterinary Microbiology 127, 128; Wildlife and Fisheries Biology 111, 120; Zoology 100, 105, 106, 112, 133, 136, 137.

and Fisheries Biology 111, 120; Zoology 100, 105, 106, 112, 133, 136, 137.

(b) *Population biology and ecology:* Anthropology 154A; Botany 117, 141; Entomology 104; Environmental Studies 100, 121; Genetics 105; Geology 150C; Microbiology 120; Wildlife and Fisheries Biology 110, 151; Zoology 125.

(c) *Evolutionary biology:* Anthropology 151, 152; Botany 100, 116, 140; Genetics 103; Geology 107; Plant Science 103; Zoology 148.

(d) *Physiology:* Botany 111, 112; Microbiology 130A-130B; Physiology 110, 117; Plant Pathology 130; Zoology 142, 143.

(e) *Biochemistry and cell biology:* Biochemistry 101A-101B; Botany/Zoology 130; Physiological Sciences 101A-101B; Physiology 100A-100B.

**Total Units for the Major** ..... 73-78**Breadth Subject Matter***College of Letters and Science students:*

Refer to the College section for a description of requirements to be completed in addition to the major.

**B.S. Major Requirements:****UNITS****Preparatory Subject Matter** ..... 61-66

Biological Sciences 1A-1B-1C ..... 15

Chemistry 1A-1B-1C or 4A-4B-4C ..... 15

Chemistry 8A-8B or 128A-128B-128C-129A ..... 6-11

Mathematics 16A-16B-16C ..... 9

Physics 5A-5B-5C ..... 12

Statistics 13 or 102 ..... 4

Recommended: Chemistry 5, a course in computer programming.

**Depth Subject Matter** ..... 45

Biochemistry 101A-101B or Physiological Sciences 101A-101B ..... 6-7

Genetics 100 ..... 4

Restricted Electives ..... 34-35

Upper division biological sciences courses to include:

(1) a minimum of 2 units or 6 (quarter) hours of laboratory classes,

(2) at least two courses from each of the three Area Requirement lists: animal biology, microbiology, plant biology (see "Course List for Area Requirement" section following the B.S. major requirements. The lists apply to both the A.B. and B.S. majors.), and

(3) at least one course from each of the five Group Requirement lists, (a) through (e) following.

**Note:** A course that appears on both the Area and Group Requirement lists may be used toward satisfying both requirements. Both halves of sequential courses connected by a hyphen must be taken.

**Course List for Group Requirement**

(a) *Organismal biology:* Botany 102, 105, 108, 114, 118, 119; Entomology 101, 102, 103; Microbiology 105, 162; Veterinary Microbiology 127, 128; Wildlife and Fisheries Biology 111, 120; Zoology 100, 105, 106, 112, 133, 136, 137.

(b) *Population biology and ecology:* Anthropology 154A; Botany 117, 141; Entomology 104; Environmental Studies 100, 121; Genetics 105; Geology 150C; Microbiology 120; Wildlife and Fisheries Biology 110, 151; Zoology 125.

(c) *Evolutionary biology:* Anthropology 151, 152; Botany 100, 116, 140; Genetics 103; Geology 107; Plant Science 103; Zoology 148.

(d) *Physiology:* Biological Sciences 121, Botany 111, 112; Microbiology 130A-130B; Physiology 110, 117; Plant Pathology 130; Zoology 142, 143.

(e) *Biochemistry and cell biology:* Biochemistry 122, 123, 133, 143, 153; Botany 125; Botany/Zoology 130; Genetics 102A; Medical Microbiology 107; Physiology 100A-100B; Veterinary Microbiology 126; Zoology 121A, 121B, 121C.

**Note:** Biological Sciences 121 may be used to satisfy either Group D or Group E.

**Biological Chemistry****See Medicine, School of****Biological Sciences****(Intercollege Division)**

Robert D. Grey, Ph.D., Dean of Biological Sciences

Merna R. Villarejo, Ph.D., Associate Dean

Division Office, 376 Mrak Hall (916-752-0410)

**Faculty**

Faculty includes members from departments of Animal Physiology, Biochemistry and Biophysics, Botany, Genetics, Microbiology and Zoology; and academic advisers for divisional majors and instructors of upper division courses in curricula of divisional majors.

Ernest S. Chang, Ph.D., Associate Professor

Wallis H. Clark, Jr., Ph.D., Professor

Wiltraud J.C. Pfeiffer, Ph.D., Lecturer (*Biological Sciences, Microbiology*)

**Total Units for the Major ..... 106-111****Breadth Subject Matter***Written/Oral Expression*

See appropriate College section for requirement

*Breadth/General Education*

Satisfaction of General Education requirement

See also the appropriate College section for additional requirements

**Course List for Area Requirement**

- (a) *Animal biology*: Anatomy 100; Anthropology 151, 152, 153, 154A, 155, 156; Avian Sciences 100; Biological Sciences 120; Entomology 101, 102, 103, 104, 106, 109, 116, 119, 153; Environmental Studies 129; Geology 111A; Human Anatomy 101; Nematology 110; Wildlife and Fisheries Biology 110, 111, 120, 140, 151; Zoology 100, 105, 106, 112, 125, 133, 136, 137, 138, 139, 147, 148, 149, 155.
- (b) *Microbiology*: Botany 114, 118, 119; Entomology 156; Geology 111B; Medical Microbiology 107; Microbiology—all upper division courses (excluding 190-199 courses); Plant Pathology 120, 130; Veterinary Microbiology 126, 127, 128, 132.
- (c) *Plant Biology*: Botany 100, 101, 102, 105, 108, 111, 112, 114, 116, 117, 118, 119, 121, 122, 140, 141; Environmental Horticulture 105, 107; Plant Science 101, 103; Range Science 100; Vegetable Crops 105.

**Note:** Botany 114, 118, or 119 may be used for either microbiology or plant biology (not both).

**Other Upper Division Courses**

A list of courses which will be accepted in satisfaction of the upper division major requirement, without petitioning, is available in the Division of Biological Sciences Office.

There is a limitation of variable-unit courses which may be counted toward the major. Of these courses, up to 6 units of 199 courses may be counted, and no units of 197T courses may be counted.

**Major Advisers.** Contact Division Office for adviser assignments.

**Honors and Honors Programs.** Students who have met the minimum grade-point average and the units-completed criteria, and who have obtained a sponsoring faculty supervisor may elect to participate in the Biological Sciences Honors Program. The program entails completion of a research project and honors thesis through enrollment in course 194H.

The Division of Biological Sciences also confers Citations of 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.

The Division additionally recommends students in the Biological Sciences major to the College of Letters and Science for the purpose of awarding High and Highest Honors at graduation. For further details on the above programs and awards, contact the Division Office.

**Minor Program Requirements:**

The minor in Biological Sciences is designed to acquaint students with the range and variety of modern biology, including work in two of three areas: animal biology, plant biology, and/or microbiology, and in four of the following five subdisciplines: organismal biology, ecology, evolution, physiology, and/or biochemistry and cell biology. The list of required courses is restricted to those which are acceptable for the major program in Biological Sciences but which do not require extensive upper division preparatory work; substitutions of more advanced courses can be made, as appropriate, with the approval of an adviser for the minor.

Information on certification of completion of the minor program can be obtained from the Division Office.

**UNITS**  
**Biological Sciences..... 22**

Genetics 100 ..... 4

Additional upper division units (see Area and Group Requirements below).....18

**Area Requirements:**

Courses in two of three areas: Animal Biology, Microbiology, and/or Plant Biology. An extensive list of courses which will satisfy area requirements can be found under the Biological Sciences major program description above. (Courses can be used to simultaneously satisfy both the area and group requirements.)

**Group Requirements:**

At least one course or course sequence must be selected from four of the following five groups

(a) *Organismal biology*: Botany 102, 105, 114; Microbiology 105; Zoology 100, 106, 112, 136, 137

(b) *Ecology*: Anthropology 154A; Botany 101; Environmental Studies 100; Wildlife and Fisheries Biology 151; Zoology 125

(c) *Evolution*: Anthropology 151; Botany 116, 140; Genetics 103; Geology 107; Zoology 148, 149

(d) *Physiology*: Botany 111A, 111B; Physiology 110

(e) *Biochemistry and cell biology*: Biochemistry 101A-101B; Botany/Zoology 130; Physiology 100A-100B; Zoology 121A, 121B.

**Minor Adviser.** Same as for major.

**Teaching Credential Subject Representative.**

Associate Dean (Biological Sciences). See also the Teacher Education Program.

**Bodega Marine Laboratory Program**

A full quarter of undergraduate course work in marine biology is available each Spring Quarter at the Bodega Marine Laboratory (BML) located in Bodega Bay, California. Course offerings include lecture and laboratory instruction in the developmental biology and physiological adaptation of marine organisms, a weekly colloquium and an intensive individual research experience under the direction of Laboratory faculty (Biological Sciences courses 120, 120P, 121, 121P, 123). 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.

Application required. Forms can be obtained from the Division of Biological Sciences. Applications due on or before pre-registration deadline. Additional information on the Bodega Marine Laboratory Program is available from the Division Office or BML directly, (707) 875-2211, P.O. Box 247, Bodega Bay, CA 94923.

**Courses in Biological Sciences****Lower Division Courses****1. Principles of Biology**

Replaced by course 1A.

**1A. Introductory Biology (5) I, II, III. The Staff**

Lecture—4 hours; discussion—1 hour. Prerequisite: Chemistry 1B (may be taken concurrently). Introduction to biological molecules, bioenergetics, cell structure and function, elements of molecular biology, and viruses. Interdisciplinary course designed for majors in the biological sciences. This course replaces course 1.

**1B. Introductory Biology (5) I, II, III. The Staff**

Lecture—3 hours; discussion-laboratory—4 hours. Prerequisite: course 1A. Continuation of course 1A. Topics covered include transmission genetics, systematics, evolution, survey of the animal kingdom, comparative anatomy, physiology, and adaptation in animals. This course replaces Zoology 2 and 2L.

**1C. Introductory Biology (5) II. Barbour, Murphy; III. O'Neill, Stanton, Thornton**

Lecture—4 hours; laboratory—3 hours. Prerequisite: course 1B. Continuation of course 1B. Topics cov-

ered include a survey of bacteria, protozoa, algae and plants, structure and function of plant tissue, adaptive development and evolution of plants, population ecology, ecosystem analysis and human evolution. This course replaces Botany 2.

**10. General Biology (4) I. \_\_\_\_\_; II. Wheelis**

(Microbiology); III. Ketellapper (Botany)

Lecture—3 hours; discussion—1 hour. Consideration of the main features and principles of biology, with emphasis on biological processes and special reference to evolution, heredity, and the bearing of biology on human life. Designed for students not specializing in biology. Not open for credit to those who have had course 1A. General Education credit: Nature and Environment/Introductory.

**11A-11B. Issues in the Life Sciences (2-2) I, II. Vilalrejo**

Lecture—1 hour; discussion—1 hour. Prerequisite: enrollment limited to BUSP students; consent of instructor required. Designed to broaden the students' understanding of biology by demonstrating the range of subjects and approaches included in the field of biology. Both basic biological research topics and applied biology will be studied.

**19. Biology of Cancer (3) III. Pfeiffer (Biological Sciences, Microbiology)**

Lecture—3 hours. Prerequisite: course 1A or 10, or Genetics 10, or Physiology 10. Interdisciplinary course offers an introduction to the biological, clinical and psycho-social aspects of cancer, and emphasizes basic understanding of biological principles and facts about the disease process. Designed for students with little scientific background. Offered in even-numbered years.

**98. Directed Group Study (1-5) I, II, III. The Staff (Associate Dean in charge)**

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**Upper Division Courses****\*115. Problems in Marine Biology (15) III.**

Full-time study at Bodega Marine Laboratory. Prerequisite: consent of instructor based on adequate preparation for topic under consideration, i.e., appropriate laboratory courses in invertebrate zoology (normally Zoology 112-112L), microbiology (normally Microbiology 105 or 120), paleontology, geology, or botany; junior standing. Lecture, laboratory and field work, and directed study of a selected focal topic in marine biology, stressing experience in original research. Offered depending upon availability of instructors. Limited enrollment.

**120. Developmental Biology of Marine Invertebrates (4) III. Clark and Chang (Biological Sciences)**

Lecture—30 hours total; laboratory—30 hours total. Prerequisite: Zoology 100-100L, Biochemistry 101A-101B or Physiological Sciences 101A-101B; course 123 concurrently. Phylogenetic patterns of reproduction and development among the marine invertebrates. Emphasis on both modern and classical approaches to understanding gametogenesis, gamete interaction and fertilization, cleavage, cell differentiation, morphogenesis, and larval development and metamorphosis. Course offered at Bodega Marine Laboratory. (See above description for Bodega Marine Laboratory Program.)

**120P. Developmental Biology of Marine Invertebrates/Advanced Laboratory Topics (4) III. Clark and Chang (Biological Sciences)**

Laboratory—120 hours total. Prerequisite: course 120 concurrently. Students pick a research topic for intense study. Research will be related to a topic covered in course 120 and will be conducted at the Bodega Marine Laboratory with close supervision of resident faculty. (See above description for Bodega Marine Laboratory Program.)

**121. Physiological Adaptation of Marine Organisms (4) III. Clegg and Crowe (Zoology)**

Lecture—30 hours total; laboratory—30 hours total. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 101A-101B; Physics 5A-5B-5C; course 123 (concurrently). Physiological adaptation to the environment among organisms in marine and estuar-

ine habitats. Course offered at Bodega Marine Laboratory. (See above description for Bodega Marine Laboratory Program.)

**121P. Physiological Adaptation of Marine Organisms/Advanced Laboratory Topics (4) III.** Clegg and Crowe (Zoology)

Laboratory—120 hours total. Prerequisite: course 121 concurrently. Students pick a research topic for intense study. Research will be related to a topic covered in course 121 and will be conducted at the Bodega Marine Laboratory with close supervision of resident faculty. (See above description for Bodega Marine Laboratory Program.)

**123. Undergraduate Colloquium in Marine Science (1) III.** Clark (Biological Sciences)

Seminar—1 hour. Prerequisite: enrolled student at the Bodega Marine Laboratory. Series of weekly seminars by recognized authorities in various disciplines of marine sciences 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.)

**162. General Virology (see Microbiology 162)**

**194H. Research Honors (2) I, II, III.**

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.)

**197T. Tutoring in Biological Sciences (1-3) I, II, III.** The Staff (Associate Dean in charge)

Prerequisite: upper division standing; appropriate background in biological sciences. Assisting in courses in Biological Sciences under the direction of the faculty. (P/NP grading only.)

**198. Directed Group Study (1-5) I, II, III.** The Staff (Associate Dean in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**\*211. Designing Instruction in the Biological Sciences (3) II.**

Lecture—1 hour, laboratory—6 hours. Prerequisite: graduate standing. Students will each develop a unit of biological science instruction (such as a lecture, laboratory experiment, syllabus, text chapter, audio-visual module). Will consider goals; objectives; selection of appropriate pedagogical strategies, methods, and source materials; organization; development; evaluation.

**298. Group Study (1-5) I, II, III.** The Staff (Associate Dean in charge)

Prerequisite: consent of instructor. Division of Biological Sciences staff members may offer group study courses under this number.

**Professional Course**

**310. Effective Teaching of College Biology (2) III.**

Thornton (Botany)

Informal lecture-discussion—2 hours. Teaching function of an academic career; objectives, nature, and methods of effective teaching; design of curricula and courses; lecturing and leading discussions; examinations and grading; evaluation; counseling; innovation. (S/U grading only.)

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## Biomedical Engineering (A Graduate Group)

David F. Katz, Ph.D., Chairperson of the Group (916-752-1135 or 752-2504)

Group Office, 3078 Bainer Hall (Chemical Engineering), (916-752-2504/0400)

**Faculty**

Includes faculty members from the three colleges, and the Schools of Veterinary and Human Medicine. Those listed below are members of the Group Executive Committee or are faculty advisers.

Fitz-Roy E. Curry, Ph.D., Professor (*Human Physiology*)

Mont Hubbard, Ph.D., Professor (*Mechanical Engineering*)

Maury L. Hull, Ph.D., Associate Professor (*Mechanical Engineering*)

David Katz, Ph.D., Professor (*Obstetrics and Gynecology, Chemical Engineering*)

R. Bruce Martin, M.D. Professor in Residence (*Orthopaedic Surgery*)

James F. Shackelford, Ph.D., Professor (*Materials Science and Engineering*)

Keith R. Williams, Ph.D., Assistant Professor (*Physical Education*)

**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 are intended to prepare students for professional work in the effective integration of engineering with biology and medical sciences, including modeling of biological systems and the design of devices and procedures useful for human and veterinary medicine. It is a broad interdepartmental program which is best suited for students who are capable 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 such training can in principle be acquired after admission to the Group, but it generally necessitates one or more additional years of study.

**Related Courses.** Agricultural Economics 112; Biochemistry and Biophysics 215; Engineering: Chemical 154A, 154B, 161, 253A, 253B, 253C, 263; Engineering: Civil 244; Engineering: Computer Science 30, 40, 168; Engineering: Electrical and Computer Science 161, 172, 176, 177; Engineering: Materials Science 140, 142, 144; Engineering: Mechanical 171, 172, 176, 222, 276A, 276B; English 104; Human Physiology: 200, 260, 261, 285; Infectious Diseases 250; Mathematics 128A, 128B, 128C; Physical Education 101, 115, 201A, 220, 226; Physiological Sciences 260; Physiology 112, 113, 120B, 242; Rhetoric and Communication 51; Statistics 131B, 131C, 233; Zoology 106, 202, 203, 236, 241.

**Graduate Courses**

**200. Introduction to Biomedical Engineering (4) I.**

Katz

Lecture—4 hours. Introduction to application of and interaction between engineering technology and the biological and medical sciences and demonstration of some clinical applications.

**210. Introduction to Biomaterials (4) II.** Shackelford

Lecture—4 hours. Prerequisite: Engineering 45 or consent of instructor. Mechanical and atomic properties 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.

**227. Research Techniques in Biomechanics (3) II.**

Williams

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor; Physical Education 115 recommended. Experimental techniques for biomechanical analysis of human movement are examined. Techniques include data acquisition and analysis by computer, force platform analysis, strength assessment, planar and three-dimensional cinematography, data reduction and smoothing, body segment parameter determination; electromyography; biomechanical modeling. (Same as Physical Education 227.)

**\*252. Advanced Information Systems (3) II.** Walters

Lecture—2 hours; laboratory—2 hours Prerequisite: experience in initial phases of data preparation, editing and sorting; Computer Science Engineering 168 or the equivalent; must be able to perform at graduate level. To increase through examples, projects and discussions, understanding of the components of information systems, including hardware, software, economics and people, and to prepare students to apply this understanding in the solution of specific problems in the creation, design and implementation of information systems.

**290. Seminar (1) I, II, III.** Katz

Seminar—1 hour. Seminar in biomedical engineering. (S/U grading only.)

**298. Group Study (1-5) I, II, III.** The Staff

**299. Research (1-12) I, II, III, IV.** The Staff

(S/U grading only.)

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## Biophysics (A Graduate Group)

Richard Nuccitelli, Ph.D., Chairperson of the Group

Group Office, 2320 Storer Hall (916-752-7468)

**Faculty**

Includes faculty members from the Departments of Biochemistry and Biophysics, Chemistry, Physics, Zoology, and others, and the School of Medicine.

**Graduate Study.** The Graduate Group in Biophysics offers programs of study leading to M.S. and Ph.D. degrees. Biophysics is a broad interdepartmental program that is ideal for students who are comfortable with considerable independence. The emphasis is on molecular biophysics. The curriculum consists of certain core courses in biology, chemistry, and physics, followed by specialty courses related to research interests. Specific program requirements are decided upon by a curriculum committee consisting of a research supervisor, the graduate adviser, and a group member. The Committee meets to consider individual educational needs with the student.

**Graduate Adviser.** A.H. Maki (*Chemistry*).

**Graduate Courses**

**200. Current Techniques in Biophysics (2) III.** M. McNamee

Lecture—2 hours. Prerequisite: graduate standing; Biochemistry 101A, Zoology 121A or the equivalent. Current techniques in biophysics research including diffraction, magnetic resonance spectroscopy, calorimetry, optical spectroscopy, and electrophysiology. (S/U grading only.)

**200LA. Biophysics Laboratory (3) I, II, III.** The Staff (Chairperson in charge)

Laboratory—18 hours (5 weeks). Prerequisite: course 200 (may be taken concurrently). 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.

**200LB. Biophysics Laboratory (6) I, II, III.** The Staff (Chairperson in charge)

Laboratory—two 18-hour rotations (5 weeks each). 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.

**290C. Research Conference in Biophysics (1) I, II, III. The Staff (Chairperson in charge)**

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.)

**298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

(S/U grading only.)

**299. Research (1-12) I, II, III. The Staff (Chairperson in charge)**

(S/U grading only.)

## Botany

(College of Letters and Science)

Terence M. Murphy, Ph.D., Chairperson of the Department

Department Office, 143 Robbins Hall (916-752-0617)

### Faculty

Fredrick T. Addicott, Ph.D., Professor Emeritus

Lars Anderson, Ph.D., Lecturer

Floyd M. Ashton, Ph.D., Professor Emeritus

Daniel I. Axelrod, Ph.D., Professor Emeritus

Michael G. Barbour, Ph.D., Professor

David E. Bayer, Ph.D., Professor

Bruce A. Bonner, Ph.D., Associate Professor

<sup>2</sup>Paul A. Castelfranco, Ph.D., Professor

Herbert B. Currier, Ph.D., Professor Emeritus

James A. Doyle, Ph.D., Professor (*Botany, Geology*)

Clyde Elmore, Ph.D., Lecturer

Emanuel Epstein, Ph.D., Professor Emeritus

(*Botany; Land, Air and Water Resources*)

Richard H. Falk, Ph.D., Professor

Ernest M. Gifford, Jr., Ph.D., Professor Emeritus

John J. Harada, Ph.D., Assistant Professor

Hendrik J. Ketellapper, Ph.D., Professor

Donald W. Kyhos, Ph.D., Professor

Norma J. Lang, Ph.D., Professor

W. Thomas Lanini, Ph.D., Lecturer

William J. Lucas, Ph.D., Professor

Jack Major, Ph.D., Professor Emeritus

W.B. (Jim) McHenry, Lecturer Emeritus

Larry Mitch, Ph.D., Lecturer

Terence M. Murphy, Ph.D., Professor

Robert F. Norris, Ph.D., Associate Professor

Sharman O'Neill, Ph.D., Assistant Professor

Robert W. Pearcy, Ph.D., Professor

<sup>2,3</sup>Marcel Rejmanek, Ph.D., Associate Professor

Thomas L. Rost, Ph.D., Professor

Maureen L. Stanton, Ph.D., Associate Professor

Alan J. Stemler, Ph.D., Professor

C. Ralph Stocking, Ph.D., Professor Emeritus

Steven M. Theg, Ph.D., Assistant Professor

Robert M. Thornton, Ph.D., Senior Lecturer

John M. Tucker, Ph.D., Professor Emeritus

Larry Vanderhoef, Ph.D., Professor

Grady L. Webster, Ph.D., Professor

T. Elliott Weier, Ph.D., Professor Emeritus

<sup>2,3</sup>Kenneth Wells, Ph.D., Professor

### The Major Programs

Study leading to the Bachelor of Arts or Bachelor of Science degrees in botany involves several basic sciences, including mathematics, chemistry, physics, biochemistry, and genetics, as well as intensive consideration of several specialized areas of plant biology: anatomy, cell and molecular biology, morphology, systematics and plant evolution, physiology, ecology, phycology, mycology, and weed science.

Botanists may teach, conduct research, or hold administrative positions. They are employed by educational institutions, federal and state agencies such as the U.S. Department of Agriculture, the Forest Service, Environmental Protection Agency and private industry. Some botanists will have careers in the pharmaceutical, petroleum or chemical industries, seed companies, botanical gardens, plant nurseries or food companies. The developing field of plant biotechnology will offer challenging careers to botanically trained graduates, and many elect to continue study toward advanced degrees.

Students majoring in Botany in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

**Choice of College.** The Bachelor of Arts degree is offered only in the College of Letters and Science and should be selected by those interested in a less intensive program in science, but one which permits a basic introduction to plant biology. The Bachelor of Science degree is offered in both the College of Letters and Science and the College of Agricultural and Environmental Sciences and should be selected by those wishing a greater background in the fundamental sciences and in botany. There are two academic plans offered within the B.S. program.

**Graduate Study.** The Department is a nationally recognized center for research and graduate study in many areas of plant biology, including ecology and systematics, cell and developmental botany, and biophysics of plant functions. It is also a center for the study of weed science (weed biology, weed control, and herbicide physiology). Graduate students study with faculty in the Department under the auspices of the following Graduate Groups: Botany, Plant Physiology, Genetics, Cell and Developmental Biology, Biochemistry, Biophysics, Ecology, and Microbiology. Refer to specific graduate groups in this section of the catalog.

### A.B. Major Requirements

	UNITS
<b>Preparatory Subject Matter</b>	<b>39-41</b>
Biological Sciences 1A, 1B, 1C	15
Chemistry 1A, 1B, 8A, 8B	16
Statistics 13 or 102	4
Zoology 2-2L; or Microbiology 2 or 102, 3; or Geology 3-3L	4-6
<b>Depth Subject Matter</b>	<b>41-42</b>
Botany 102 or 108, 105, 111, 112, 114, 116 or 140, 117	29
Genetics 100	4
Additional upper division units in Botany or related natural science courses	8-9
<b>Total Units for the Major</b>	<b>80-83</b>

#### Recommended

Botany 100, 118, 119; Chemistry 1C.

For students with interests in specialized areas of botany (e.g. agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.) certain substitutions, including courses in other departments, may be allowed on prior consultation with a botany major adviser.

### B.S. Major Requirements:

**Option I:** For those who plan (a) advanced study in some areas of botany or a related discipline, (b) to obtain a general secondary teaching credential, or (c) training for a position requiring a detailed knowledge of plants.

	UNITS
<b>Preparatory Subject Matter</b>	<b>58-63</b>
Biological Sciences 1A, 1B, 1C	15
Chemistry 1A, 1B, 1C	15
Chemistry 8A-8B or 128A-128B-128C	15

129A	6-11
Physics 6A, 6B, 6C	12
Mathematics 16A, 16B	6
Statistics 13 or 102	4

#### Depth Subject Matter

Biochemistry 101A, 101B	6
Genetics 100	4
Botany 105, 108, 111, 111L, 112, 116, 117, 118, 119	37

#### Total Units for the Major

**105-110**

#### Recommended

Botany 199 (3-5 units); German, French, or Russian. For students with interests in specialized areas of botany (e.g., agricultural botany, ecology, systematics and evolution, morphology, plant physiology, etc.), certain substitutions, including courses in other departments, may be allowed on prior consultation with a botany major adviser.

**Option II:** For those who plan advanced study in physiology and/or biochemistry of plants.

	UNITS
<b>Preparatory Subject Matter</b>	<b>56-68</b>
Biological Sciences 1	5
Botany 2	5
Chemistry 1A-1B-1C-5 or 4A-4B-4C	15-19
Chemistry 8A-8B or 128A-128B-128C-129	8-11
Mathematics 16A-16B-16C or 21A-21B-21C	9-12
Physics 6A-6B-6C or 8A-8B-8C	12
Statistics 13 or 102	4
<b>Depth Subject Matter</b>	<b>51-54</b>
Biochemistry 101A, 101B, 101L, 122	15
Botany 105, 111, 111L, 112	14
Genetics 100	4
Chemistry 107A, 107B	6
One course in each of the following four areas	12-15
(a) Taxonomy and evolution: Botany 102, 108	
(b) Morphology and cytology: Botany 116, 130, 140	
(c) Phycology and mycology: Botany 114, 118, 119	
(d) Ecology: Botany 117	
<b>Total Units for the Major</b>	<b>107-122</b>

#### Recommended

Botany 199 (3-5 units); German, French, or Russian; Engineering 5 or Computer Science Engineering 30. Certain substitutions, including courses in other departments, may be allowed on prior consultation with the botany major adviser.

#### Breadth Subject Matter

College of Agricultural and Environmental Sciences students	24
English and/or rhetoric	8
Social sciences and/or humanities	16
See also the College section for additional requirements.	

#### College of Letters and Science students:

Refer to the College section for a description of requirements to be completed in addition to the major.

#### Major Adviser:

J.J. Harada.

### Minor Program Requirements:

	UNITS
<b>Botany</b>	<b>23</b>
To satisfy the requirements for a Botany minor, a student must complete Botany 2 (or equivalent introductory botany course)	5
Upper division units including at least one course from each of the four groups	18
(a) Structural botany: Botany 105, 114, 116, 118, 119, 130	
(b) Physiological botany: Botany 111, 112, Plant Science 102	
(c) Ecological botany: Botany 101, 117, 118	

- 141, Zoology 149  
 (d) Systematics and evolution: Botany 102, 114, 116, 118, 119, 140  
 Botany 114, 116, 118 and 119 may be offered toward satisfaction of either group (a) or (d) above. However, a single course may not satisfy both groups' requirements.

**Minor Adviser.** Same as for Major above.

**Honors and Honors Program.** Students on the honors list may elect to substitute a maximum of 5 units of 194H for 5 upper division units of the regular major; however, recommendations for high honors and highest honors at graduation are not dependent on the completion of 194H. Refer to the Academic Information section and the appropriate College section for Dean's Honors List information.

**Teaching Credential Subject Representative.** R. M. Thornton. See also the Teacher Education Program.

**Graduate Study.** Graduate programs leading to M.S. and Ph.D. degrees are offered in cytology, plant physiology, plant molecular biology, anatomy, morphology, taxonomy, ecology, mycology, phycology, and allied areas. The resources of the department are augmented by appropriate courses in related departments.

## Courses in Botany

### Lower Division Courses

**2. Introductory Survey of Botany** (5) I. Kyhos, Lang  
 This course will be offered for the last time in fall 1990. It will then be replaced by Biological Sciences 1C.

**10. Plants, People and the Biosphere** (3) II. Falk  
 Lecture—3 hours; one weekend field trip (half-day); term paper. Ethnobotanical and ecological themes are emphasized in examining our dependence on plants, the ecological roles of plants, and the development of botany as a contemporary science. Non-science majors are encouraged to enroll. General Education credit: Nature and Environment/Introductory.

**92. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)  
 Laboratory—3-36 hours. Prerequisite: consent of instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Botany Department faculty. (P/NP grading only.)

**98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
 Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge.)  
 Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**100. Evolutionary Biology of Plants** (4) II. Stanton, Kyhos, Doyle  
 Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to evolutionary principles and processes, emphasizing plants. Topics include: mutation, selection, gene flow, chromosome evolution, speciation, adaptive radiation, reconstruction of evolutionary relationships, evolutionary rates and trends, and origin of new groups.

**101. Survey of Plant Communities of California** (3) III. Barbour  
 Lecture—2 hours; weekend field trips—4 to 8 days. Prerequisite: Biological Sciences 1C and course 10 recommended. Structure of selected plant communities and the relationship of their component species to the environment. Recommended for non-majors. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Botany 10.

**102. California Floristics** (5) III. Webster  
 Lecture—2 hours; lecture-discussion—1 hour; laboratory—6 hours (includes three one-day, weekend field trips). Prerequisite: Biological Sciences 1A, 1B,

1C or the equivalent in plant science. Survey of the flora of California, with emphasis on field recognition and identification of important vascular plant families and genera characterizing the major floristic regions. Lectures review the taxonomic diversity, evolutionary relationships, and geographical patterns of California flora.

**105. Developmental Plant Anatomy** (5) I. Rost  
 Lecture—3 hours; laboratory—6 hours. Prerequisite: introductory plant biology (for example, Biological Sciences 1C). Survey of vascular plant structure and development. Current ideas and experimental evidence for developmental concepts.

**\*106. Plant Cell, Tissue and Organ Development**

(3) II. Rost  
 Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A, 1B, 1C. Current concepts of the development of plant cells, tissues, and organs. Emphasis will be on structural aspects. Offered in odd-numbered years.

**108. Systematic Botany of Flowering Plants** (5) III.

The Staff  
 Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Laboratory and field studies of the characters and relationships of the principal families and orders of flowering plants. Principles of taxonomy. Practice in identification of species by means of keys.

**111. Plant Physiology** (3) I. Stemler, Lucas

Lecture—3 hours. Prerequisite: Biological Sciences 1C; Chemistry 8B (may be taken concurrently); Physics 5A, 5B, 5C recommended. Fundamental activities of plants; the plant cell as a functioning unit. Processes of absorption, movement, and utilization of water and minerals. Water loss, translocation, photosynthesis, respiration.

**111D. Problems In Plant Physiology** (1) I. Lucas, Stemler

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.)

**111L. Introductory Plant Physiology Laboratory**

(3) III. Bonner  
 Discussion—1 hour; laboratory—6 hours. Prerequisite: course 111 (may be taken concurrently). Introduction to basic experimental techniques and instrumentation used in the investigation of plant physiological processes such as water-solute absorption and their movement and utilization; translocation; transpiration; photosynthesis; respiration; growth; development and reproduction.

**112. Plant Growth and Development** (3) II. Thornton  
 Lecture—3 hours. Prerequisite: Biological Sciences 1C; Chemistry 8B; course 111 and Biochemistry 101A recommended. Processes, dynamics, and control of growth and development. Metabolism.

**112D. Problems in Plant Growth and Development** (1) II. Thornton

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.)

**114. Fungi, Algae, and Bryophytes** (5) III. Wells, Lang

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to the morphology, taxonomy, evolution, and physiology of the fungi, algae, liverworts, and mosses. Not open for credit to students who have completed course 118 or 119.

**\*115. Marine Botany** (10) Extra-session summer.

Lecture—10 hours; laboratory—20 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Full-time study at the Bodega Marine Laboratory. Includes lectures, laboratories, and field work with emphasis on the

morphology, identification, and natural history of the marine algae.

**116. Morphology and Evolution of Vascular Plants**

(4) II. Gifford  
 Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to form, structure, and evolutionary history of selected plants from major divisions; emphasis given to living ferns and seed-producing plants and their possible relationships to plants of past eras; structure-function relationships and adaptations to changing environments.

**117. Plant Ecology** (4) I. Stanton, Rejmanek, Pearcy

Lecture—3 hours; three to five field trips (Friday or weekend). Prerequisite: Biological Sciences 1A, 1B, 1C; course 111D and course 102 or 108 strongly recommended. The study of interactions between plant populations or vegetation types and their environment. Special emphasis on California. Students taking course 117 cannot receive credit for course 101.

**118. Phycology** (5) II. Lang

Lecture—3 hours; laboratory—6 hours; one weekend field trip. Prerequisite: Biological Sciences 1A, 1B, 1C. Comparative morphology, physiology and development of major divisions (including cyanobacteria) with emphasis on phylogeny in Chlorophyta; laboratory exercises stress identification and culturing. Environmental significance and exploitation of freshwater and marine forms considered.

**119. Introductory Mycology** (5) I. The Staff

Lecture—3 hours; laboratory—6 hours; one weekend field trip. Prerequisite: Biological Sciences 1A, 1B, 1C. Introduction to structure, ontogeny, and taxonomy of selected species of the major divisions of the fungi.

**120. Introduction to Weed Science** (3) II. Bayer

Lecture—2 hours; discussion—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C; Chemistry 8A, 8B. Principles of weed science including mechanical, biological, and chemical control methods. Weed control in crop, pasture, range, brush, forests, aquatic, and non-crop situations. Types of herbicides. Application of herbicides. Sight identification of common weeds and demonstrations to illustrate the principles.

**\*121. Biology of Weeds** (3) III. The Staff

Lecture—2 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Origin and evolution, beneficial and harmful aspects, reproduction and dispersal, seed germination and dormancy, growth and development, ecology, interaction of weeds and crops, natural succession, and herbicide-induced succession. Laboratories will emphasize taxonomy of weeds and demonstrate principles discussed in lectures.

**\*122. Action of Herbicides** (3) III. The Staff

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 120; Soil Science 100; courses 111, 111D recommended. Influence of plants and soils on the action of herbicides. Absorption, translocation, fate, mechanism of action and symptoms of herbicides in plants. Effects of herbicides on plant populations. Physical and molecular fate of herbicides in soils.

**125. Molecular Biology of Plant Development** (3)

III. Murphy  
 Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C; Biochemistry 101B; Genetics 102A or course 111. Gene expression and gene structure and their influence on growth and differentiation of higher plant tissues.

**130. Survey of Cell Biology** (4) I. Leslie (Zoology); II. Falk, Theg

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 8B or 128C; introductory course in biochemistry strongly recommended. Survey of cell biology presenting the structure and function of the major cellular organelles. Topics discussed include energy metabolism, motility, gene expression, and membranes. Currently popular methodologies used in cell biology will be presented in a discussion section. Not open to students who have credit in Zoology 121A, 121B. (Same course as Zoology 130.)

**\*135. Mineral Nutrition of Plants (4) III.** The Staff  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 111 or the equivalent. Evolution and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation; mineral metabolism; deficiencies and toxicities; genetic and ecological aspects of plant nutrition. (Same course as Plant Science 135.)

**140. Paleobotany (4) III.** Doyle

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. 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.

**141. Plant Geography (3) II.** Webster

Lecture—3 hours. Prerequisite: course 102, course 108, or the equivalent. Survey of the geographical distribution patterns of vegetation types and selected groups of vascular plants, with consideration of the environmental and historical factors that determine the patterns. Offered in odd-numbered years.

**\*150. Biology and Management of Freshwater Macrophytes (3) I.** Anderson

Lecture—3 hours; two field trips. Prerequisite: Biological Sciences 1A, 1B, 1C; Chemistry 8B; course 111 or Water Science 122 recommended. Brief survey of common fresh water macrophytes, their reproductive modes, physiology, growth (photosynthesis, nutrient utilization), development (hormonal interactions), ecology and management. Offered in odd-numbered years.

**\*155. Anatomical and Cytological Methods (4) III.** The Staff

Lecture—1 hour; discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. Practical laboratory methods in preparing biological materials for examination with the light microscope; special emphasis given to localization of cell constituents; introduction to photomicrography and autoradiography.

**190C. Research Conference in Botany (1) I, II, III.** The Staff

Discussion—1 hour. Prerequisite: upper division standing in botany or related discipline; consent of instructor. Introduction to research methods in botany. 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.)

**192. Internship (1-12) I, II, III.** The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: upper division standing; consent of instructor. Technical and/or professional experience on or off campus. Supervised by a member of the Botany Department faculty. (P/NP grading only.)

**194H. Special Study for Honors Students (1-5) I, II, III.** The Staff (Chairperson in charge)

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 Botany (1-5) I, II, III.** The Staff

Tutoring—1-5 hours. Prerequisite: upper division standing and consent of instructor. Designed for undergraduate students who desire teaching experience. Student contact will be primarily in laboratory or discussion sections. (P/NP grading only.)

**198. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge.)

Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

**202. Plant Ecophysiology (3) I.** Pearcy

Lecture—3 hours. Prerequisite: courses 111, 112, 117, and consent of instructor. Study of the mechanisms of physiological adaptation of plants to their environment.

**203. Ecophysiological Methods (3) III.** Pearcy

Lecture—1 hour; laboratory—4 hours; individual project; one Saturday field trip to be arranged. Prerequisite: courses 111, 117, and consent of instructor. A laboratory and lecture course covering basic concepts underlying the research methods and instrumentation useful in plant ecophysiology.

**205A. Advanced Plant Physiology (3) III.** Lucas

Lecture—3 hours. Prerequisite: course 112; Chemistry 107A or consent of instructor. Cellular physiology, plant water relations, translocation and membrane transport.

**205B. Advanced Plant Physiology (3) II.** Castelfranco

Lecture—3 hours. Prerequisite: course 112, Biochemistry 101B. Photosynthesis, respiration, and general plant metabolism.

**205C. Advanced Plant Physiology (3) I.** Bonner

Lecture—3 hours. Prerequisite: course 112; Biochemistry 101A; courses 205A, 205B and Biochemistry 101B recommended. Internal and environmental regulation of plant growth and development.

**\*206A. Advanced Plant Physiology Laboratory (3) III.** Lucas

Laboratory—6 hours; term paper. Prerequisite: course 205A (may be taken concurrently). Laboratory procedures in plant physiology. Experiments demonstrate the theory and practice of modern instrumentation, and are designed to illustrate subject matter of course 205A.

**\*206B. Advanced Plant Physiology Laboratory (3) II.** Castelfranco

Laboratory—9 hours. Prerequisite: course 205B (may be taken concurrently); Biochemistry 101L. Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205B.

**\*206C. Advanced Plant Physiology Laboratory (3) I.** The Staff

Laboratory—9 hours. Prerequisite: course 205C (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 205C.

**212. Physiology of Herbicidal Action (3) II.** Bayer

Lecture—3 hours. Prerequisite: courses 112, 122. Study of the fundamental processes involved in the physiological action of herbicides. Detailed consideration of the fate of herbicides in plants.

**215. Light and Plant Growth (3) II.** Bonner

Lecture—3 hours. Prerequisite: courses 205A, 205B, 205C; Physics 5B. Mechanisms and phenomena involved in the control of plant growth by light. Photoperiodism, photomorphogenesis, phototropism, and certain aspects of photosynthesis. Course offered in even-numbered years.

**\*221. Special Topics in Plant Physiology (2) III.**

The Staff

Discussion—1 hour; seminar—1 hour. Analysis in depth of recent advances in plant physiology. Lectures and discussions by research specialists. Term paper integrating and analyzing lectures required. May be repeated for credit. (S/U grading only.)

**\*222. Special Topics in Plant Morphology, Systematics, and Ecology (2) II.** Doyle, Webster

Seminar—2 hours. Analysis of recent advances in plant structure and evolution. Lectures and discussions by research specialists. Term paper integrating and analyzing lectures required. May be repeated once for credit. (S/U grading only.) Offered in even-numbered years.

**227. Plant Molecular Biology (4) III.** Harada

Lecture-discussion—4 hours. Prerequisite: Biological Sciences 1A, 1B, 1C and Genetics 102A-102B, or Biochemistry 153. 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.

**228. Plant Molecular Biology Laboratory (4) II.**

Harada, Bennett (Vegetable Crops)

Lecture—1 hour; laboratory—10 hours. Prerequisite: Biochemistry 101L, a course in molecular genetics and consent of instructors; course 227 recommended. Research methods in plant molecular biology. Topics include analysis of gene expression, characterization of gene structure, and gene transfer technology. Emphasis will be placed on analysis of developmentally regulated gene expression. (Same course as Vegetable Crops 228.)

**\*231. Biological Electron Microscopy (1) II.** Falk

Lecture—1 hour. Prerequisite: consent of instructor. Introduction to biological microscopy. Areas covered are: electron optics, electron specimen interactions, and vacuum systems.

**\*231L. Biological Electron Microscopy Laboratory (3) II.** Falk

Laboratory—9 hours. Prerequisite: consent of instructor; course 231 (may be taken concurrently). Introduction to biological electron microscopy. Areas covered are: specimen preparation and microscope operation. Limited enrollment.

**240. Paleobotany and Angiosperm Evolution (4) I.**

Doyle

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 108, 116, or 140. Critical analysis of the plant fossil record as a source of evidence on origin, evolution, and phylogeny of the angiosperms, Cretaceous and Tertiary climates, geographic history of modern taxa, and origin of modern vegetation types. Offered in even-numbered years.

**\*243. Palynology (4) I.** Doyle

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 108, 116, or 140. Morphology of spores and pollen grains and their use in stratigraphy, plant systematics and evolution, and paleoecology. Techniques for study of modern spores and pollen and extraction and identification of fossil palynomorphs from sediments of Paleozoic to Quaternary age. Offered in odd-numbered years.

**\*255. Principles of Plant Taxonomy (4) I.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 108; Genetics 103 recommended. Principles of plant taxonomy; phylogenetic vs. phenetic classification; examples of the way in which various disciplines—anatomy, embryology, biochemistry, etc.—elucidate problems of taxonomic relationship, mainly of genera and higher categories.

**256A. Experimental Plant Taxonomy (2) II.** Kyhos

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 102; course 117 and Genetics 103 recommended. Application of experimental techniques to the elucidation of taxonomic problems and evolutionary relationships in higher plants. Offered in odd-numbered years.

**256B. Experimental Plant Taxonomy (2) III.** Kyhos

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 256A. Continuation of course 256A. Study of variation in natural populations in relation to taxonomy; the application of population sample analysis, cytogenetics, transplant studies, etc., to the solution of taxonomic problems and the clarification of relationships. Offered in odd-numbered years.

**290. Seminar (1) I.** Ketellapper; II. Vanderhoef

Seminar—1 hour. (S/U grading only.)

**290C. Research Conference in Botany (1) I, II, III.**

The Staff

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.)

**291. Seminars in Botany (1) I.** O'Neill

Seminar—1 hour. 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.)

**295. Seminar in Mycology** (1) I. Butler (Plant Pathology); III. Wells

Seminar—1 hour. Review and evaluation of current literature and research in mycology. (S/U grading only.) (Same course as Plant Pathology 295.)

**297T. Tutoring in Botany** (1-5) I, II, III. The Staff

Prerequisite: graduate standing and consent of instructor. Designed for graduate students who desire teaching experience, but are not teaching assistants. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (S/U grading only.)

**Professional Course****390. The Teaching of Botany** (2) I, II, III. The Staff (Chairperson in charge)

Discussion—2 hours. Prerequisite: graduate standing; concurrent appointment as a teaching assistant in Botany. 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.)

Preparation should include a year of calculus, physics, general chemistry and organic chemistry, and introductory courses in statistics, biochemistry, genetics and biology.

**Graduate Advisers.** C.A. Erickson (Zoology), S. Meisel (Human Anatomy).

**Courses in Cell and Developmental Biology****Graduate Courses****200. Current Techniques in Cell Biology** (2) I. Nucitelli

Lecture—2 hours. Current techniques used in cell biology research including microscopy, spectroscopy, electrophysiology, immunochemistry, histology, organelle isolation, calorimetry, tissue culture and gel electrophoresis. Lectures are presented by experts on each technique, with emphasis on pitfalls to avoid when using the technique. (S/U grading only.) (Same course as Zoology 200.)

**200LA. Cell and Developmental Biology Laboratory** (3) I, II, III. The Staff (Chairperson in charge)

Laboratory—18 hours (one five-week assignment). Prerequisite: course 200 (may be taken concurrently). Assignment in research laboratory of a Cell and Developmental Biology graduate group member. Individual research problems with emphasis on methodological/procedural experience and experimental design. (Same course as Zoology 200LA.)

**200LB. Cell and Developmental Biology Laboratory** (6) I, II, III. The Staff (Chairperson in charge)

Laboratory—18 hours (two five-week assignments). Prerequisite: course 200 (may be taken concurrently). Assignments in research laboratories of Cell and Developmental Biology graduate group members. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated for credit. (Same course as Zoology 200LB.)

**205. Cell Biology of the Cytoskeleton** (2) III. Tablin, Aggeler

Lecture—1 hour and discussion 1/2 hour (course hours entered to run sequentially); student presents critical analysis of current journal article and submits written outline and reference list for that publication. General organization of the cytoskeleton; introduction to cytoskeletal proteins: actin, tubulin, intermediate filaments, myosin, and other associated proteins. Presentation of current problems related to specialized cytoskeletal systems. Topics vary. (S/U grading only.) Even-numbered years only.

**290. Current Topics in Cell and Developmental Biology** (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by guest lecturers describing their research activities. May be repeated for credit. (S/U grading only.)

**290C. Research Conference in Cell and Developmental Biology**

(1) I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour. Prerequisite: graduate standing in Cell and Developmental Biology and/or consent of instructor; course 299 concurrently. Presentation and discussion of faculty and graduate-student research in cell and developmental biology. May be repeated for credit. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

**Chemistry**

(College of Letters and Science)

Kevin M. Smith, Ph.D., Chairperson of the Department

\_\_\_\_\_, Ph.D., Vice-Chairperson of the Department  
Department Office, 108 Chemistry Building  
(916-752-0503/0953; FAX 916-752-5995)

**Faculty**

<sup>3</sup>Thomas L. Allen, Ph.D., Professor

Lawrence J. Andrews, Ph.D., Professor Emeritus

Alan L. Balch, Ph.D., Professor

Albert T. Bottini, Ph.D., Professor

Robert K. Brinton, Ph.D., Professor Emeritus

R. David Britt, Ph.D., Assistant Professor

Joyce T. Doi, Ph.D., Associate Adjunct Professor

Timothy C. Donnelly, Ph.D., Lecturer

<sup>2,3</sup>W. Ronald Fawcett, Ph.D., Professor

William H. Fink, Ph.D., Professor

Edwin C. Friedrich, Ph.D., Professor

Sevgi S. Friedrich, Ph.D., Lecturer

Hakon Hope, Cand. real., Professor

William M. Jackson, Ph.D., Professor

Susan M. Kauzlarich, Ph.D., Assistant Professor

Raymond M. Keefer, Ph.D., Professor Emeritus

Joel E. Keizer, Ph.D., Professor

Peter B. Kelly, Ph.D., Assistant Professor

Richard E. Kepner, Ph.D., Professor Emeritus

Mark J. Kurth, Ph.D., Professor

Gerd N. LaMar, Ph.D., Professor

Carlito B. Lebrilla, Ph.D., Assistant Professor

August H. Maki, Ph.D., Professor

Donald A. McQuarrie, Ph.D., Professor

Claude F. Mearns, Ph.D., Professor

<sup>1</sup>R. Bryan Miller, Ph.D., Professor

Tadeusz F. Molinski, Ph.D., Assistant Professor

W. Kenneth Musker, Ph.D., Professor

Krishnan P. Nambiar, Ph.D., Assistant Professor

Michael H. Nantz, Ph.D., Assistant Professor

Charles P. Nash, Ph.D., Professor

Edgar P. Painter, Ph.D., Professor Emeritus

Philip P. Power, Ph.D., Professor

<sup>4</sup>Peter A. Rock, Ph.D., Professor

Carl W. Schmid, Ph.D., Professor

Neil E. Schore, Ph.D., Professor

Kevin M. Smith, Ph.D., Professor

Leo H. Sommer, Ph.D., Professor Emeritus

James H. Swinehart, Ph.D., Professor

Dino S. Tinti, Ph.D., Professor

Nancy S. True, Ph.D., Professor

David H. Volman, Ph.D., Professor Emeritus

Fred E. Wood, Ph.D., Lecturer

George S. Zweifel, Sc.D., Professor

**The Major Programs**

The goal of a bachelor's program in chemistry is to give a broad introduction to the principles of the field and to provide enough of the factual knowledge so that the student may quickly learn the specific chemistry applicable to the field in which the student chooses to work. Two programs in chemistry are available, one leading to the Bachelor of Arts and the other to the Bachelor of Science. Students who are interested in chemistry as a profession would normally elect the program leading to the B.S. degree, which is accredited by the American Chemical Society. The curriculum leading to an A.B. degree offers a less intensive program in chemistry and is appropriate for a student with a strong interest in chemistry, but who also has another goal such as professional school preparation or secondary school teaching. Students who plan to pursue graduate work in chemistry or related fields are strongly advised to obtain a reading knowledge of German or Russian. High school students should note that the preparation for either the A.B. or the B.S. degree is simplified if their high school programs include chemistry and four years of mathematics. Degree candidates in chemistry will receive upper division credit for those lower division chemistry courses accepted in lieu of upper division courses required for the major.

**Botany (A Graduate Group)**

Students admitted into the Botany Graduate Group before June 10, 1989 will be allowed to complete their degree in this subject.

New students, however, should see the Plant Biology Graduate Group section in this catalog.

Information. 152 Robbins (916-752-7094).

**Cantonese****See Asian American Studies****Cell and Developmental Biology (A Graduate Group)**

David W. Deamer, Ph.D., Chairperson of the Group  
(916-752-2175)

Group Office, 2320 Storer Hall (916-752-7468)

**Faculty.** The group includes 34 faculty members from fourteen departments in the College of Agricultural and Environmental Sciences, College of Letters and Science, and the Schools of Medicine and Veterinary Medicine.

**Graduate Study.** The Graduate Group in Cell and Developmental Biology offers programs of study leading to the Ph.D. degree. Cell and Developmental Biology is a broad interdepartmental program. The curriculum consists of core courses in cell biology or developmental biology. Specific programs of study are decided upon by an advisory committee chaired by the student's research adviser, and the choice of major core courses will reflect the student's primary research interest.

**Preparation.** Appropriate preparation is an undergraduate degree in a biological or physical science.

**Career Alternatives.** Chemistry graduates with bachelor's degrees are employed extensively throughout industry in production supervision, quality control, technical marketing, and other areas of applied chemistry. Some of the firms employing these graduates are in the food and beverage processing industries, the petroleum industry, paper and textile production and processing, the chemical industry, pharmaceuticals, and the photographic industry. An advanced degree is usually required for a career in research or education.

### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>36-43</b>
Chemistry 1A-1B-1C-5 or 4A-4B-4C... 15-19	
Physics 5A-5B-5C .....	12
Mathematics 21A-21B-21C or 16A-16B-16C .....	9-12
<b>Depth Subject Matter</b> .....	<b>36</b>
Chemistry 110A, 110B, 110C, 124A, 128A, 128B, 128C, 129A, 129B .....	25
At least 11 additional upper division units in chemistry (except Chemistry 107A or 107B), biochemistry, or physics.....	11
<b>Total Units for the Major</b> .....	<b>72-79</b>

### B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>49-53</b>
Chemistry 1A-1B-1C-5 or 4A-4B-4C... 15-19	
Physics 9A, 9B, 9C, 9D.....	16
Mathematics 21A, 21B, 21C, 22B; 22A or 22C.....	18
<b>Depth Subject Matter</b> .....	<b>47</b>
Chemistry 110A, 110B, 110C, 111, 115, 124A, 124B or 124C, 128A, 128B, 128C, 129A, 129B, 129C.....	38
At least 9 additional upper division units in chemistry (except Chemistry 107A, 107B), including one course with laboratory work .....	9
<b>Total Units for the Major</b> .....	<b>96-100</b>

**Major Advisers.** A.T. Bottini, W.H. Fink, E.C. Friedrich, R.E. Kepner, P.A. Rock, C.W. Schmid, N.E. Schore, D.S. Tinti, F.E. Wood.

**Honors and Honors Program.** The student must take a minimum of 6 units of course 194H spread out over a minimum of two quarters with a comprehensive written report of the project submitted at the end of the final quarter.

**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 writing to the Graduate Adviser, Department of Chemistry. See also the Graduate Division section in this catalog.

## Courses in Chemistry

### Lower Division Courses

**1A. General Chemistry** (5) I. Jackson, Rock, Wood; II. Lamar, McQuarrie, \_\_\_\_\_  
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: high school chemistry and physics and good facility in algebra and geometry including logarithms and exponents recommended. Fundamental principles of chemistry. Chemical reactions and equations, periodic table, stoichiometry, gases, thermochemistry, atomic and molecular structure. General Education credit for non-GE course sequence (1A-1B) which will satisfy one GE course: Nature and Environment/Introductory. (CAN Chem Seq A)

**1B. General Chemistry** (5) II, \_\_\_\_\_, Donnelly, Rock; III. Wood, \_\_\_\_\_  
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 1A or 4A. Continuation of course 1A. Liquids, colligative properties of solutions, chemical equilibria, acids and bases, oxida-

tion-reduction reactions, thermodynamics, electrochemistry, introduction to qualitative analysis. General Education credit for non-GE course sequence (1A-1B) which will satisfy one GE course: Nature and Environment/Introductory. (CAN Chem Seq A)

**1C. General Chemistry** (5) I, \_\_\_\_\_, Kauzlarich, Britt  
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 1B or 4B. Continuation of course 1B. Chemical kinetics, bonding, chemistry of the main group elements, coordination chemistry, nuclear chemistry, application of principles of chemistry to qualitative analysis. (CAN Chem Seq A)

**4A. General Chemistry** (5) I. Tinti  
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Mathematics 21A (may be taken concurrently); high school chemistry and physics. Stoichiometry, the periodic table, chemical reactions and equations, physical properties and kinetic theory of gases, atomic and molecular structure and chemical bonding. Intended for students majoring in the physical sciences or engineering. Course sequence 4A-4B-4C is equivalent to sequence 1A-1B-1C-5.

**4B. General Chemistry** (5) II. Wood  
Lecture—3 hours, laboratory—6 hours. Prerequisite: course 4A. Continuation of course 4A. Chemical thermodynamics; the properties of liquids and solutions; quantitative treatment of chemical equilibria with applications to precipitation reactions; acid-base reactions, and oxidation-reduction reactions; elementary electrochemistry. Laboratory will emphasize quantitative wet-chemical techniques.

**4C. General Chemistry** (5) III. Nash  
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 4B. Continuation of course 4B. Chemical kinetics, topics in systematic inorganic chemistry, the solid state, nuclear chemistry, introduction to organic chemistry and biochemistry. Laboratory will emphasize qualitative analysis and preparative techniques.

**5. Quantitative Analysis** (4) I, III. Donnelly  
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 1C with a grade of C or higher. An introduction to the principles and methods of quantitative chemical analysis with emphasis on the application of equilibrium theory to analytical problems. Students who have received credit for the 4A-4B-1C sequence may enroll in course 5 for 2 units only; not open to students who have received credit for 4A-4B-4C.

**8A. Organic Chemistry: Brief Course** (3) I.  
\_\_\_\_\_; II. S. Friedrich; III. Bottini  
Lecture—3 hours. Prerequisite: course 1B with a grade of C or higher. With course 8B an introduction to the nomenclature, structure, chemistry, and reaction mechanisms of organic compounds. Intended for students majoring in areas other than chemistry.

**8B. Organic Chemistry: Brief Course** (3) I. Doi; II. Musker; III. Doi  
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 8A. Continuation of course 8A. The laboratory is concerned primarily with the study of the properties and chemistry of the common classes of organic compounds.

**10. Concepts of Chemistry** (4) I. Swinehart  
Lecture—4 hours. A survey of basic concepts and contemporary applications of chemistry. Designed for non-science majors and not as preparation for Chemistry 1A. Course not open to students who have had Chemistry 1A; but students with credit for course 10 may take Chemistry 1A for full credit. General Education credit: Nature and Environment/Introductory.

**98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

#### 107A. Physical Chemistry for the Life Sciences

I. Fink  
Lecture—3 hours. Prerequisite: course 4C or 5 or consent of instructor. Mathematics 16C or 21C; one year college level physics. A basic course in physical chemistry intended for majors in the life science areas. Introductory development of classical and statistical thermodynamics including equilibrium processes and solutions of nonelectrolytes. Kinetic theory of gases and liquids. Transport processes in liquids and solutions.

#### 107B. Physical Chemistry for the Life Sciences

II. Schmidt  
Lecture—3 hours. Prerequisite: course 107A. Electrochemistry and the thermodynamics of simple electrolyte solutions. Chemical rate processes. Introduction to spectroscopy, atomic and molecular structure, x-ray crystallography, radiation and nuclear chemistry, and to surface chemistry and colloidal systems. Considerations on bioirreversible processes.

#### 108. Physical Chemistry of Macromolecules

III. Meares  
Lecture—3 hours. Prerequisite: course 107B or 110C. Physical properties and characterization of macromolecules with emphasis upon those of biological interest. Structural thermodynamic, optical and transport properties of polymers in bulk and in solution. Physical characterization methods. Special topics on the properties of polyelectrolyte systems.

#### 110A. Physical Chemistry: Thermodynamics

(3) I. Nash, Hope; III. Kelly  
Lecture—3 hours. Prerequisite: course 5 or 4C; Mathematics 21C or 16C; one year of college physics. Development and application of the principles of chemical thermodynamics.

#### 110B. Physical Chemistry: Quantum Mechanics

(3) I. McQuarrie; II. Fink  
Lecture—3 hours. Prerequisite: course 110A. Atomic and molecular structure and spectra.

#### 110C. Physical Chemistry: Kinetics

(3) II. Jackson; III. Keizer  
Lecture—3 hours. Prerequisite: course 110B. Statistical thermodynamics, kinetic theory of gases, and chemical kinetics.

#### 111. Physical Chemistry: Methods and Applications

(4) I. Maki; III. Tinti  
Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 110C (may be taken concurrently) and 115. Introduction to the chemical literature, methods of data analysis, techniques of physical measurements, vacuum systems. Laboratory experiments from the areas of thermodynamics, spectroscopy, and kinetics.

#### 115. Instrumental Analysis

(4) II. Lebrilla  
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 110A. Theory and practice of modern instrumental techniques of chemical analysis with emphasis on electroanalytical and spectroscopic methods and separation science. Introduction to instrumentation electronics. Laboratory focuses on trace analyses of samples having practical significance.

#### 120. Physical Chemistry Laboratory: Advanced Methods

(3) II. Hope  
Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 110C and 111. Design of experiments; experimental control and data acquisition using microcomputers. Laboratory emphasizes the use of microcomputers in advanced physical-chemical experiments.

#### 121. Introduction to Molecular Structure and Spectra

(4) III. True  
Lecture—4 hours. Prerequisite: course 110B. Modern theoretical and experimental methods used to study problems of molecular structure and bonding; emphasis on spectroscopic techniques.

#### 124A. Inorganic Chemistry: Fundamentals

(3) I. Power  
Lecture—3 hours. Prerequisite: course 1C or 4C. Symmetry, molecular geometry and structure, molecular orbital theory of bonding (polyatomic molecules

and transition metals), solid state chemistry, energetics and spectroscopy of inorganic compounds.

**124B. Inorganic Chemistry: Main Group Elements**

(3) II. Swinehart

Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of inorganic and heteroorganic molecules containing the main group elements.

**124C. Inorganic Chemistry: d and f Block Elements** (3) III. Balch

Lecture—3 hours. Prerequisite: course 124A. Synthesis, structure and reactivity of transition metal complexes, organometallic and bioinorganic chemistry, the lanthanides and actinides.

**128A. Organic Chemistry** (3) I. Musker; II. Schore; III. Molinski

Lecture—3 hours. Prerequisite: course 1C or 4C 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. Only two units credit allowed students having had course 8B.

**128B. Organic Chemistry** (3) I. Zweifel; II. Nambiar

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.

**128C. Organic Chemistry** (3) I. Nantz; II. E. Friedrich; III. Zweifel

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.

**129A. Organic Chemistry Laboratory** (2) I, III. S. Friedrich; II. —

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1C or 4C with a grade of C or higher; 128A (may be taken concurrently). Introduction to laboratory techniques of organic chemistry. Emphasis is on methods used for separation and purification of organic compounds.

**129B. Organic Chemistry Laboratory** (2) I, II, III.

The Staff

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.

**129C. Organic Chemistry Laboratory** (2) I. Bottini; II. Doi; III. Nambiar

Laboratory—6 hours. Prerequisite: courses 128C (may be taken concurrently) and 129B. Continuation of course 129B.

**130. Qualitative Organic Chemistry** (4) III. E. Friedrich

Lecture—1 hour; laboratory—9 hours. Prerequisite: courses 5, 128C, 129C. Application of physical and chemical techniques to the qualitative identification of organic compounds.

**131. Modern Methods of Organic Synthesis** (3) II. Zweifel

Lecture—3 hours. Prerequisite: course 128C. Introduction to modern synthetic methodology in organic chemistry with emphasis on stereoselective reactions and application to multistep syntheses of organic molecules containing multifunctionality.

**140. Synthetic Methods** (4) III. Power

Lecture—1 hour; laboratory—9 hours. Prerequisite: courses 124A, 128C, 129C. Integrated inorganic-organic course in the preparation, purification and characterization of multifunctional organic, organometallic, and transition metal compounds using a wide range of methods.

**150. Chemistry of Natural Products** (3) I. Molinski

Lecture—3 hours. Prerequisite: course 128C. Chem-

istry of terpenes, steroids, acetogenins, and alkaloids; isolation, structure determination, biosynthesis, chemical transformations, and total synthesis.

**192. Internship in Chemistry** (1-6) I, II, III. The Staff (Chairperson in charge)

Internship—3-18 hours. Prerequisite: upper division standing; project approval by faculty sponsor prior to enrollment. Supervised work-learn experience in chemistry; requires a final written report. May be repeated for credit for a total of 6 units. (P/NP grading only.)

**194H. Undergraduate Research** (2-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: course 110C (may be taken concurrently) and honors status. Original research and a written report of the investigation. Unit value to be determined by instructor supervising the research. (P/NP grading only.)

**195. Industrial Chemistry** (1) I. Wood

Seminar—2 hours. Prerequisite: junior or senior standing in Chemistry. Designed to give Chemistry undergraduate students an in-depth perception of careers in the chemical industry. Professional chemists will give seminars describing both research and career insights. The research seminar will be technical while the career-oriented seminar will be more general. (P/NP grading only.)

**197. Projects in Chemical Education** (1-4) I, II, III.

The Staff (Chairperson in charge)

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.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor based upon adequate preparation in chemistry, mathematics, and physics. (P/NP grading only.)

**Graduate Courses**

**201. Basic Chemical Uses of Symmetry and Group Theory** (2) I. Kauzlarich

Lecture—2 hours. Prerequisite: graduate standing in chemistry. Symmetry elements, operations and point group, molecular symmetry. Representations of groups. Applications to molecular orbitals and molecular vibrations.

**205. Symmetry, Spectroscopy, and Structure** (3)

II. Kelly

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.

**210A. Quantum Chemistry: Introduction and Stationary-State Properties** (3) II. Tinti

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.

**210B. Quantum Chemistry: Time-Dependent Systems** (3) III. Fink

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.

**210C. Quantum Chemistry: Molecular Spectroscopy** (3) I. True

Lecture—3 hours. Prerequisite: course 210B. Molecular spectroscopy: Born-Oppenheimer approximation, rotational, vibrational and electronic spec-

troscopy, spin systems, and molecular photophysics.

**211A. Advanced Physical Chemistry: Statistical Thermodynamics** (3) I. Britt

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.

**211B. Statistical Mechanics** (3) III. Keizer, McQuarrie

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 odd-numbered years.

**212. Chemical Dynamics** (3) II. Jackson

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 even-numbered years.

**215. Theoretical and Computational Chemistry** (3)

III. Keizer, McQuarrie, Fink

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 even-numbered years.

**216. Magnetic Resonance Spectroscopy** (3) II. Maki, LaMar

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 odd-numbered years.

**217. X-Ray Structure Determination** (3) III. Hope

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.

**218. Physical Principles of Macromolecular Structure** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 211A 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 even-numbered years.

**219. Spectroscopy of Organic Compounds** (3) I. B. Friedrich

Lecture—3 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.

**221A-H. Special Topics in Organic Chemistry** (3) I, II, III. The Staff

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.

**226. Principles of Transition Metal Chemistry** (3) I. Balch

Lecture—3 hours. Prerequisite: course 124A or the equivalent. Electronic structures, bonding, and reactivity of transition metal compounds.

**227A-F. Special Topics in Inorganic Chemistry** (3)

I, II, III. The Staff

Lecture—3 hours. Prerequisite: consent of instructor. Series of advanced, research-oriented special topics

courses in inorganic chemistry.

**\*228A. Bioinorganic Chemistry** (3) III. Swinehart  
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 (next offering Spring 1991).

**\*228B. Main Group Chemistry** (3) III. Power

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 (next offering Spring 1993).

**228C. Solid-State Chemistry** (3) III. Kauzlarich

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 (next offering Spring 1992).

**230A-J. Special Topics in Physical Chemistry** (3) I, II, III. The Staff

Lecture—3 hours. Prerequisite: consent of instructor. Series of advanced, research-oriented, special-topics courses in physical chemistry. Topics will vary each time the course is offered.

**231. Organic Synthesis: Methods and Strategies** (3) III. Nantz

Lecture—3 hours. Prerequisite: course 131 or the equivalent. Provides a broadly based discussion of current strategies in synthetic organic chemistry. Focus on methods for constructing carbon frameworks, controlling relative stereochemistry, and controlling absolute stereochemistry. Retrosynthetic strategies will be discussed throughout the lectures.

**233. Physical-Organic Chemistry** (3) II. Bottini

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.

**235. Organometallic Chemistry in Organic Synthesis** (3) III. Schore, Zweifel

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.

**\*236. Chemistry of Natural Products** (3) II. The Staff

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.

**237. Bioorganic Chemistry** (3) I. Nambiar

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 odd-numbered years.

**240. Advanced Analytical Chemistry** (3) I. Lebrilla

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.

#### 241A-D. Special Topics in Analytical Chemistry

(3) III. The Staff

Lecture—3 hours. Prerequisite: consent of instructor. Series of advanced, research-oriented, special-topics courses in analytical chemistry. Topics will vary each time course is offered.

**290. Seminar** (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)

**293. Introduction to Chemistry Research** (1) I. The Staff (Smith in charge)

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.)

**295. Industrial Chemistry** (1) I. Kurth

Seminar—2 hours. Prerequisite: graduate standing in Chemistry. Designed to give Chemistry graduate students an in-depth perception of careers in the chemical industry. Professional chemists will give seminars describing both research and career insights. The research seminar will be technical while the career-oriented seminar will be more general. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

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 Course

**390. Methods of Teaching Chemistry** (3) I, II, III.

The Staff (Chairperson in charge)

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: graduate student standing in Chemistry; 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 observing and guiding student laboratory work. Participation in the teaching program required for Ph.D. in Chemistry. May be repeated for credit. (S/U grading only.)

### The Major Program

The interdepartmental major now allows for two emphases, one in humanities and the other in sociology. The *humanities* track introduces the student to Chicano/Mexicano history and social sciences, but stresses in-depth knowledge of the Spanish language, linguistics, Chicano/Mexicano culture and literature. This curriculum is flexible enough to accommodate primary professional interests in bilingual education, community or social service, or advanced graduate and/or professional preparation. The *sociology* track combines traditional courses in sociology with substantive area courses that deal intensively with the Chicano/Mexicano experience. The sociology emphasis promotes a greater understanding of the social, political, and cultural life of Chicano/Mexicano people, and it provides a solid basis of knowledge for those who wish to work in a bicultural setting. It is designed for students interested in public service careers such as law school, graduate school, public administration, or community groups. Students who have demonstrated language fluency in Spanish through the placement examination can accelerate their program considerably; thus the language placement examination is strongly recommended to all students entering the program.

### A.B. Major Requirements:

#### Humanities Emphasis

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>12-42</b>
Chicano Studies 10 .....	4
Chicano Studies 20 .....	4
Linguistics 1 .....	4
Spanish 1, 2, 3 (or the equivalent) .....	0-18
Spanish 4 or 7A, 5 or 7B, 28 .....	0-12
<b>Depth Subject Matter</b> .....	<b>38-40</b>
History 169A, 169B; 166A or 166B .....	12
Political Science 168 .....	4
Sociology 110 or Spanish 124 .....	4
Spanish 126, 129, 135 .....	12
One course from Linguistics 115, 150 or Education 151 .....	3-4
One course from Spanish 131, 132, 133-34 .....	4
<b>Total Units for the Major</b> .....	<b>50-82</b>
<b>Recommended</b> American Studies 45, 101, Anthropology 134, 140B, 141A; Linguistics 115 and 150 (above), Sociology 124, 130; Spanish 8A, 8B, 9 (for non-native speakers of Spanish); Spanish 108B, 132 and 133 (above), 300.	

#### Sociology Emphasis

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>25-37</b>
Chicano Studies 10 .....	4
Chicano Studies 20 .....	4
Linguistics 1 .....	4
Sociology 1, 46A, 46B .....	13
Spanish 4 or 7A, 5 or 7B, 28 .....	0-12
<b>Depth Subject Matter</b> .....	<b>43</b>
Chicano Studies 102 .....	4
History 169B .....	4
Linguistics 115 .....	3
Political Science 168 .....	4
Sociology 110, 140, 165A, 169 .....	16
Electives, a maximum of 12 units chosen from any of the following courses with no more than 2 courses from any one group .....	12
Group 1: History 166A, 166B, or 169A	
Group 2: Linguistics 150, Spanish 126	
Group 3: Sociology 118, Agricultural Economics 150	
Group 4: Applied Behavioral Sciences 172, 176, Chicano Studies 132	
<b>Total Units for the Major</b> .....	<b>68-80</b>

**Master Adviser.** A. Sosa-Riddell.

**Major Advisers.** *Humanities Emphasis:* A.C. Chabram, M. Montoya, V.L. Ruiz. *Sociology Emphasis:* Y. Flores-Ortiz, B. Pesquera.

**Further Study.** If you are contemplating studies in a

graduate or professional school you can, with the aid of an adviser, build a program around an additional discipline of your choice, i.e., Spanish or Spanish-American literature, history, or political science. If you are contemplating a career in bilingual education you should consult the Department of Education for information about the Teacher Credential Program.

### Minor Program Requirements:

This interdepartmental minor provides the student with a general overview of Chicanos/Mexicanos in terms of the history, culture, political involvement and role in the society of the Southwestern United States.

UNITS

#### Chicano (Mexican-American) Studies.....23-24

Chicano Studies 10 or 20 .....	4
History 169A or 169B .....	4
Political Science 168 .....	4
Sociology 110 or Spanish 124 .....	4
Two elective courses to be chosen from Chicano Studies 102, 132, Education 151, History 169A or 169B (not to duplicate one of the above), Linguistics 115, Sociology 169, Spanish 126 .....	7-8

### Courses in Chicano Studies

#### Lower Division Courses

##### 10. Introduction to Chicano Studies (4) I. Sosa-Riddell

Lecture—3 hours; discussion—1 hour. Analysis of the situation of the Chicano (Mexican-American) people, emphasizing their history, literature, political movements, education and related areas.

##### 20. Development of Chicano Culture and Literature (4) II. Chabram

Lecture—3 hours; discussion—1 hour. Knowledge of Spanish not required. Panoramic view of the development of Chicano cultural and literary forms from the 1940's to the present. Course explores how Chicano literary texts and other artistic forms reflect social, political, and cultural transformations.

##### 98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

##### 99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only)

#### Upper Division Courses

##### 102. Chicanas in Contemporary Society (4) II. Pesquera

Lecture—3 hours; term paper. Prerequisite: course 10 or Spanish 124 or History 169B. Analysis of the role and status of Chicanas in contemporary American society. Special emphasis is on their historical role, the political, economic and social institutions which have affected their status, and their contributions to society and their community.

##### 130. United States-Mexican Border Relations (4)

III. Riddell

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.

##### 132. Political Economy of Chicano Communities (4) III. Riddell

Lecture—3 hours; term paper. Prerequisite: upper division standing; lower division Chicano Studies course recommended. Historical and contemporary study of political and economic forces which define and influence the development of Chicano communities. Includes critiques of traditional and Marxist theories and concepts applicable to Chicano communities, case studies of Chicano communities, especially in California and Texas. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 1 or 2.

##### 194HA-HB-HC. Senior Honors Research Project (2-5) I, II, III. The Staff

Independent study—6-15 hours. Prerequisite: senior standing in Chicano Studies major. Student is required to read, research, and write Honors Thesis on Chicano Studies topics. (Deferred grading only, pending completion of sequence)

##### 198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: upper division standing and consent of Program Chairperson. (P/NP grading only.)

##### 199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: upper division standing and consent of Program Chairperson. (P/NP grading only.)

Y.H. Peter Chen, M.A., Lecturer  
David W. Fahy, M.A., Lecturer  
Donald Gibbs, Ph.D., Associate Professor  
Susan Griswold, Ph.D., Assistant Professor  
Jong S. Kim, B.A., Lecturer  
Key H. Kim, Ph.D., Professor Emeritus  
Yun-chen Li, M.A., Lecturer  
Mau-sang Ng, Ph.D., Associate Professor  
Hisami Okada, M.A., Lecturer  
Haruko Sakakibara, M.A., Lecturer  
Ritsuko Shigeyama, M.A., Lecturer  
Benjamin E. Wallacker, Ph.D., Professor  
Young Ming Wu, M.A., Lecturer  
Michelle Yeh, Ph.D., Assistant Professor  
Jiuwu Zhang, M.A., Lecturer

**Related Courses.** See East Asian Studies course listing.

## Child Development (A Graduate Group)

Rosemarie Kraft, Ph.D., Chairperson of the Group  
Group Office, 103 AOB 4 (916-752-4360)

**Faculty.** Includes faculty members from the departments of Applied Behavioral Sciences, Anthropology, Behavioral Biology, Education, Psychology, and the Schools of Law and Medicine.

**Graduate Study.** The Graduate Group in Child Development offers a multidisciplinary program leading to a master of science degree. The aim of the program is to provide students with an opportunity to pursue a coordinated course of postgraduate study in the field of child development which cuts across departmental boundaries. Opportunities are provided to work with children and adults in the community including the University's Early Childhood Laboratory (ECL). Recipients of the degree gain sufficient background in the biological and social sciences to engage in professions dealing with children, obtain positions in teaching or research settings, or pursue further study leading to a doctorate in child development or related fields.

**Graduate Adviser.** J.N. Welker (*Human Development*).

## Chinese

### See Chinese and Japanese (below); Asian American Studies; and East Asian Studies

## Chinese and Japanese

(College of Letters and Science)

Robert Borgen, Ph.D., Program Director  
Program Office, TB 134 (916-752-4995)

#### Committee in Charge

Robert Borgen, Ph.D. (*Chinese and Japanese*)  
Chia-ning Chang, Ph.D. (*Chinese and Japanese*)  
Donald Gibbs, Ph.D. (*Chinese and Japanese*)  
Susan Griswold, Ph.D. (*Chinese and Japanese*)  
Mau-sang Ng, Ph.D. (*Chinese and Japanese*)  
Don C. Price, Ph.D. (*History*)  
Benjamin E. Wallacker, Ph.D. (*Chinese and Japanese*)  
Michelle Yeh, Ph.D. (*Chinese and Japanese*)

#### Faculty

Robert Borgen, Ph.D., Associate Professor  
Chia-ning Chang, Ph.D., Assistant Professor  
Kazue Chavez, B.A., Lecturer

#### Chinese and Japanese

UNITS  
**Chinese.....18**  
**Japanese.....18**  
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; Japanese 10, 15, 25) may also be used. For details, consult the undergraduate adviser.  
**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.  
**Student Advisers.** C.N. Chang (*Japanese*), M. Yeh (*Chinese*)  
**Prerequisite Credit.** No student may repeat a course if that course is a prerequisite for a course which has already been completed with a grade of C- or better.

### Courses in Chinese

#### Lower Division Courses

##### 1. Elementary Chinese (5) I. The Staff

Lecture-discussion—5 hours. Introduction to Chinese grammar and development of all language skills in a cultural context with special emphasis on communication. (Students who have successfully completed Chinese 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.)

##### 1A. Intensive Elementary Modern Chinese (10) II. The Staff

Lecture—5 hours; discussion—5 hours. Combines the work of courses 1 and 2 into a single quarter. Those who complete this course may go on to course 3.

##### 2. Elementary Chinese (5) II. The Staff

Lecture-discussion—5 hours. Prerequisite: course 1. Continuation of course 1 in the areas of grammar and basic language skills.

##### 3. Elementary Chinese (5) III. The Staff

Lecture-discussion—5 hours. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills, continuation of course 2.

##### 3A. Situational Chinese (2) I, III. The Staff

Discussion—2 hours. Prerequisite: course 3 (may be taken concurrently). Instructor and students create a specific social situation and establish roles for student-participants. Using techniques of drama and substitution drills, students have greater opportunity.

ties to develop spoken skills than is possible in course 3.

**4. Intermediate Modern Chinese** (4) I. The Staff  
Lecture—3 hours; recitation—2 hours. Prerequisite: course 3. Intermediate-level training in spoken and written Chinese in cultural context.

**5. Intermediate Modern Chinese** (4) II. The Staff  
Lecture—3 hours; recitation—2 hours. Prerequisite: course 4. Continuation of course 4.

**6. Intermediate Modern Chinese** (4) III. The Staff  
Lecture—3 hours; recitation—2 hours. Prerequisite: course 5. Continuation of course 5.

**6A. Situational Chinese** (2) I, III. The Staff  
Discussion—2 hours. Prerequisite: course 6 (may be taken concurrently.) Instructor and students create a specific social situation and establish roles for student-participants. Using techniques of drama and oral repetition, students develop spoken fluency and appropriateness of expression as skills requisite to internships and study in China.

**10. Modern Chinese Literature (in English)** (4) I.  
Gibbs  
Lecture—3 hours; 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.

**11. Great Books of China** (2) II. Wallacker  
Lecture—1 hour; discussion—1 hour. Selected readings in English translations. (P/NP grading only.)

**98. Directed Group Study** (1-5) I, II, III. The Staff  
(Chairperson in charge)  
(P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III.  
The Staff (Chairperson in charge)  
(P/NP grading only.)

### Upper Division Courses

**104. Twentieth-century Chinese Fiction (in English)** (4) III. Ng  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or a course in Chinese history recommended. 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.

**105. Western Influences on Twentieth-Century Chinese Literature (in English)** (4) III. Ng  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or History 9A recommended. 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 even-numbered years.

**106. Chinese Poetry (in English)** (4) III. Yeh  
Lecture—3 hours; discussion—1 hour. Prerequisite: History 9A or any course on traditional China recommended. 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.

**107. Traditional Chinese Fiction (in English)** (4) I.  
Ng  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or a course in Chinese history. English-language course studying the dawn of Chinese fiction and its development down to modern times. Combines survey history with close reading of representative works such as *The Story of the Stone* and famous Ming-Qing short stories.

**108. Poetry of China and Japan (in English)** (4) II.  
Borgen, Yeh  
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.

Offered in odd-numbered years. (Same course as Japanese 108.)

**109A-I. Topics in Chinese Literature (in English)**  
(4) III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: on topic, course 10, 11, 104, 106, 107, or a course in Chinese history. Topics in Chinese literature may include: A) crime and punishment; B) love in poetry; C) women writers; D) the knight-errant; E) the city in fiction; F) the recluse; G) the literature of twentieth-century Taiwan; H) popular literature; I) the scholar and the courtesan. Offered in odd-numbered years.

**111. Modern Chinese: Reading and Discussion** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or the equivalent. Readings in modern Chinese newspaper articles, essays, and short stories, based on language skills developed in courses 1 through 6.

**112. Modern Chinese: Reading and Discussion** (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 111. Readings in modern Chinese newspaper articles, essays, and short stories, based on language skills developed in course 111.

**113. Modern Chinese: Reading and Discussion** (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 112. Readings in modern Chinese newspaper articles, essays, and short stories, based on language skills developed in course 112.

**114. Introduction to Classical Chinese: Confucius**  
(4) I. Gibbs and staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or consent of instructor. Texts from the Confucian canon are read with the assistance of prepared word glossaries so that while learning to read classical Chinese, the students also experience the most influential books in the history of China in their original texts.

**115. Introduction to Classical Chinese: Mencius**

(4) II. Gibbs and staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 114. Continues course 114 by reading selections from the text of the Mencius.

**116. Introduction to Classical Chinese: Narrative Styles** (4) III. Gibbs and staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 115. Continues course 115 by reading selections from the Records of the Grand Historian and other early, influential works.

**120. Advanced Chinese** (4) I, II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 113 or consent of instructor. Selected readings from all genres to develop advanced skills in reading, writing, aural comprehension, and translation. May be repeated once for credit.

**130. Readings in Traditional Chinese Fiction** (4) II.

Ng  
Lecture—1 hour; discussion—3 hours. Prerequisite: course 112 or the equivalent; course 114 recommended. Close reading in Chinese of representative works from the Tang Dynasty (618-907) to modern times. May be repeated once for credit when content varies.

**131. Readings in Traditional Chinese Poetry** (4) I.

Yeh  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or 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.

**132. Readings in Modern Chinese Poetry** (4) II.

Yeh  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 6 or 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.

**140. Readings in Classical Chinese** (4) I, II, III. Wallacker

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 twice for credit.

**160. The Chinese Language** (4) III. Wallacker

Lecture-discussion—4 hours. Prerequisite: course 6 (may be taken concurrently); Linguistics 1 recommended. 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.

**192. Chinese Internship** (1-12) I, II, III. The Staff

Internship—2-36 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.)

**197T. Tutoring in Chinese** (1-5) I, II, III. The Staff

Tutoring—1-5 hours. Prerequisite: consent of Program 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) I, II, III. The Staff

(Chairperson in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates**  
(1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

### Graduate Course

**299. Research** (1-12) I, II, III. The Staff  
(S/U grading only.)

### Courses in Japanese

#### Lower Division Courses

**1. Elementary Japanese** (5) I. The Staff

Lecture-discussion—5 hours. Introduction to spoken and written Japanese in cultural context, with emphasis on communication. (Students who have successfully completed Japanese 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.)

**1A. Intensive Elementary Japanese** (10) II. The Staff

Lecture—5 hours; discussion—5 hours. Combines the work of courses 1 and 2 into a single quarter. Those who complete this course may go on to course 3.

**2. Elementary Japanese** (5) II. The Staff

Lecture-discussion—5 hours. Prerequisite: course 1 or the equivalent. Continuation of training in basic spoken and written skills.

**3. Elementary Japanese** (5) III. The Staff

Lecture-discussion—5 hours. Prerequisite: course 2 or the equivalent. Continuation of training in basic spoken and written skills.

**4. Intermediate Japanese** (4) I. The Staff

Lecture—3 hours; recitation—2 hours. Prerequisite: course 3 or the equivalent. Intermediate-level training in spoken and written Japanese in cultural context.

**5. Intermediate Japanese** (4) II. The Staff

Lecture—3 hours; recitation—2 hours. Prerequisite: course 4 or the equivalent. Continuation of course 4.

**6. Intermediate Japanese** (4) III. The Staff

Lecture—3 hours; recitation—2 hours. Prerequisite: course 5 or the equivalent. Continuation of course 5.

**10. Masterworks of Japanese Literature (in English)** (3) III. Fahy

Lecture—2 hours; discussion—1 hour. An introduction to Japanese literature: readings and discussion

in English of important works from earliest times to the present.

**15. Introduction to Traditional Japanese Culture**

(3) II. Borgen

Lecture—2 hours; discussion—1 hour. General introduction to Japanese culture from its beginnings through 1850, focusing on religion, thought, and the arts (visual and performing). Indigenous traditions and the assimilation of foreign influences will be discussed. Readings and discussions in English.

**25. Japanese Language and Culture (in English)**

(4) II. Shibamoto

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. Offered in odd-numbered years.

**98. Directed Group Study (1-5) I, II, III. The Staff**

(Chairperson in charge)

(P/NP grading only.)

**99. Special Study for Undergraduates (1-5) I, II, III.**

The Staff (Chairperson in charge)

(P/NP grading only.)

**Upper Division Courses**

**101. Japanese Literature in Translation: The Early Period** (4) I. Borgen

Lecture—3 hours; discussion—1 hour. 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.

**102. Japanese Literature in Translation: The Middle Period** (4) II. Griswold

Lecture—3 hours; discussion—1 hour. The major literary genres from the twelfth century to the second half of the nineteenth century including poetry, *renga*, military chronicles, *No* drama, Buddhist literature, *haiku*, *Haibun*, *Kabuki*, *bunraku*, plays and Edo prose narratives.

**103. Japanese Literature in Translation: The Modern Period** (4) III. Chang

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.

**104. Modern Japanese Literature: War and Revolution** (3) I. Chang

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 even-numbered years.

**105. Modern Japanese Literature: Hero and Anti-hero** (3) II. Chang

Lecture-discussion—3 hours. The ways in which representative heroes and anti-heroes in modern Japanese literature perceive, confront, struggle with, and resolve a wide array of social, moral, and intellectual problems in their times. Lectures, discussions, and readings in English. Offered in odd-numbered years.

**106. Japanese Culture Through Films** (3) II. Chang

Lecture-discussion—3 hours. Aspects of Japanese cultural expression about love, the supernatural, and the family; perceptions of childhood, youth, and death as revealed in internationally-acclaimed films by Kurosawa, Ozu, Kobayashi, Itami, and Morita. Lectures, discussions, and readings in English. Films with English subtitles. Offered in odd-numbered years.

**108. Poetry of China and Japan (in English)** (4) II.

Borgen, Yeh

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. Offered in odd-numbered years. (Same course as Chinese 108.)

**111. Modern Japanese: Reading and Discussion**

(4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 6. Readings in modern Japanese short stories, newspaper articles, and essays; conversation practice based on these readings.

**112. Modern Japanese: Reading and Discussion**

(4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 111. Continuation of course 111.

**113. Modern Japanese: Reading and Discussion**

(4) III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 112. Continuation of course 112.

**114A. Spoken Japanese** (2) I. The Staff

Discussion—2 hours. Prerequisite: course 6 or the equivalent. Training in spoken Japanese for students with a basic working knowledge of the language. (P/NP grading only.)

**114B. Spoken Japanese** (2) II. The Staff

Discussion—2 hours. Prerequisite: course 114A 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.)

**115. Japanese Composition** (2) I. The Staff

Lecture—2 hours. Prerequisite: 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.

**131. Readings in Modern Japanese Literature: 1920-1945** (4) III. Chang

Lecture—3 hours; discussion—1 hour. Prerequisite: course 123 or the equivalent. 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.

**132. Readings in Modern Japanese Literature: 1945-1970** (4) II. Chang

Lecture—3 hours; discussion—1 hour. Prerequisite: course 123 or the equivalent. 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.

**133. Readings in Modern Japanese Literature: 1970 to Present** (4) I. Griswold

Lecture—3 hours; discussion—1 hour. Prerequisite: course 123 or the equivalent. Continuation of course 132, but may be taken independently. Covers selected texts from 1970 to the present. Offered in odd-numbered years.

**134. Readings in the Humanities: Traditional Culture** (4) II. Borgen

Lecture—3 hours; discussion—1 hour or term paper. Prerequisite: course 113. 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.

**135. Readings in the Humanities: The Modern Period** (4) I. Chang

Lecture—3 hours; term paper. Prerequisite: course 113. 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.

**136. Readings in Newspapers and Magazines** (4)

III. Griswold

Lecture—3 hours; discussion—1 hour. Prerequisite: course 123 or the equivalent. Fourth-year level reading of newspaper and magazine reports, articles, and editorials on domestic and international affairs relating to contemporary Japan. Offered in even-numbered years.

**192. Japanese Internship** (1-12) I, II, III. The Staff

Internship—3-36 hours to be arranged. Prerequisite: upper division standing and consent of instructor. Work experience in Japanese language, with analytical term paper on a topic approved by instructor. (P/NP grading only.)

**197T. Tutoring in Japanese** (1-5) I, II, III. The Staff

Tutoring—1-5 hours. Prerequisite: consent of Program 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) I, II, III. The Staff

(Chairperson in charge)

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates**

(1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses**

**201. Introduction to Classical Japanese** (4) I. Borgen

gen

Lecture—3 hours; discussion—1 hour. Prerequisite: course 123 or the equivalent. Introduction to essential grammatical structure of classical Japanese using selections from classical Japanese prose and poetry.

**202. Introduction to Classical Japanese** (4) II. Borgen

Lecture—3 hours; discussion—1 hour. Prerequisite: course 201. Readings of relatively easy texts of classical Japanese poetry and prose assisted by annotations written in modern Japanese.

**203. Introduction to Classical Japanese** (4) III. Griswold

Lecture—3 hours; discussion—1 hour. Prerequisite: course 202. Readings of classical and pre-modern Japanese prose and poetry beginning with late Heian works and proceeding to Kamakura, Muromachi and later periods. Readings include plays, Edo narratives, classical Chinese text and early Meiji writings.

**291. Seminar in Modern Japanese Literature: Major Writers** (4) III. Chang

Seminar—4 hours. Prerequisite: any one of courses 131, 132, 133, 134, 135, or the equivalent. 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 Toshio, Akutagawa Ryunosuke, Tanizaki Junichiro, Abe Kobo and Oe Kenzaburo. Offered in even-numbered years.

**299. Research** (1-12) I, II, III. The Staff

(S/U grading only.)

**Classics**

(College of Letters and Science)

David A. Traill, Ph.D., Program Director

Department Office (Spanish and Classics), 616

Sproul Hall (916-752-0835)

**Faculty**

Richard E. Grimm, Ph.D., Associate Professor

Lynn E. Roller, Ph.D., Associate Professor

Wesley E. Thompson, Ph.D., Professor

David A. Traill, Ph.D., Professor

## The Major Programs

Classics, as a university discipline, can be defined broadly or narrowly; broadly, it is the study of all aspects of ancient Greek and Roman life; narrowly, it is the study of the Greek and Latin languages and their literatures. The Department offers three majors that reflect these different definitions of the subject: the Classical Civilization major offers a broad interdisciplinary approach to the world of the Greeks and Romans, while the Latin and Greek majors focus on language and literature.

Classics is a discipline that is at once demanding and rewarding. It takes imagination and considerable effort to develop a sympathetic understanding of the concerns and preoccupations of people who lived more than two thousand years ago. Moreover, the languages which provide the key to understanding these cultures require a sustained commitment. In return, study of the Greeks and Romans enables the classicist to gain a unique perspective on the full sweep of western civilization, for the influence of these peoples in most areas of human endeavor has been all-pervasive and continues to this day. Even students who complete only one or two quarters of Latin or Greek find that they have a much clearer understanding of English grammar and that their vocabulary has been considerably enlarged. These are significant and lasting benefits.

**Career Opportunities.** Majors in Classics can make direct use of their knowledge in careers in library science, museum work, or high school teaching, or by going on to divinity school. There is now an acute shortage of high school teachers of Latin nationwide. More generally, Classics is a highly regarded liberal arts degree that trains students to think critically about complex issues. These skills can be applied to any field. It is said that if you can succeed in Classics you can succeed in anything. It is a particularly good choice as a pre-law major—not because of the scattering of Latin phrases that survive in legal terminology but because of the meticulous attention to detail which the study of an ancient language requires and fosters. It is also a good tactical choice for a pre-medicine major since medical schools are seeking to diversify their student intake by giving preference to those with unusual degrees. For whatever reasons, all the undergraduate majors in Classics at Davis in the last twenty years who have sought admission to law school or medical school have been accepted. Others have embarked on promising careers in a wide variety of fields including computers, library science, intelligence work, publishing, social work, and real estate.

Majors planning to go on to graduate work in Classics should bear in mind that professional classicists are expected to know both Greek and Latin and have reading competence in French and German.

### Classical Civilization

#### A. B. Major Requirements:

UNITS

<b>Preparatory Subject Matter</b> .....	<b>24</b>
Greek 1, 2, 3 or Latin 1, 2, 3 or the equivalent.....	15
Three courses from the following .....	9
(a) Classics 17A, 17B, 17C, 20.	
(b) Classics 4A, 10.	
<b>Depth Subject Matter</b> .....	<b>40</b>
Three upper division courses in Latin or Greek.....	12
At least 28 units from the following, with or without emphasis in a single area, chosen in consultation with a major adviser .....	28
(a) <i>Language and Literature</i> : All upper division courses in Latin and Greek; Classics 140, 141, 142, 143	
(b) <i>History</i> : History 111A, 111B, 111C, 102A Religious Studies 102	
(c) <i>Art, Archaeology, and Drama</i> : Classics 174, 175, Art 154A, 154B, 155, Dramatic Art 156	

(d) *Philosophy and Political Theory*: Philosophy 143, 161, 162, Political Science 118A, Rhetoric and Communication 110

#### Total Units for the Major .....

**64**

#### Recommended

Art 1A; History 2; Philosophy 21; Comparative Literature 1; Religious Studies 40.

#### Greek

#### A. B. Major Requirements:

UNITS

<b>Preparatory Subject Matter</b> .....	<b>0-15</b>
Greek 1, 2, 3 (or the equivalent) .....	15

#### Depth Subject Matter .....

Upper division units in Greek (two courses may be chosen from department-approved courses in related fields).

#### Total Units for the Major .....

**36-51**

#### Recommended

Latin 1, 2, 3.

#### Latin

#### A. B. Major Requirements:

UNITS

<b>Preparatory Subject Matter</b> .....	<b>15</b>
Latin 1, 2, 3 (or the equivalent) .....	15

#### Depth Subject Matter .....

Latin 121 .....

At least 31 additional upper division units in Latin .....

31

#### Total Units for the Major .....

**36-51**

**Major Advisers.** D. A. Traill, L.E. Roller (Classical Civilization); W. E. Thompson (Greek); and R. E. Grimm (Latin).

### The Minor Program

The Department offers minors in Greek and Latin for those wishing to follow a shorter but still formally recognized program of study in classics.

#### Minor Program Requirements:

UNITS

#### Greek .....

**21**

Greek 3 .....

5

Four upper division courses in Greek .....

16

#### Latin .....

**21**

Latin 3 .....

5

Four upper division courses in Latin .....

16

### Graduate Program

The Department offers a master's degree in Classics with emphasis on either Greek or Latin. The program is suitable for high school teachers seeking to improve their qualifications and for students wishing to prepare themselves for admission to one of the more competitive doctoral programs in Classics.

**Teaching Credential Subject Representative.** R. E. Grimm. See also the Teacher Education Program.

**Graduate Study.** A program of study and research leading to the M.A. degree in Classics is offered. Detailed information regarding graduate study may be obtained from the Graduate Adviser.

**Graduate Adviser.** D.A. Traill.

### Courses in Classics

#### Lower Division Courses

##### 4A. Classical Civilization (3) I, III. The Staff

Lecture—3 hours. An introduction to the literature, art, and institutions of classical Greece. General Education credit: Civilization and Culture/Introductory.

##### 10. Greek and Roman Mythology (3) I, II, III. The Staff

Lecture—3 hours. Origin and development of myths

and legends, their place in the religion, literature, and art of Greece and Rome.

##### 17A. Mediterranean Bronze Age Archaeology (3) I. Roller

Lecture—3 hours. Archeological monuments of the Ancient Near East, including Egypt and Mesopotamia, and of Greece and Crete during the Bronze Age. Special emphasis on the Minoan and Mycenaean civilizations. General Education credit: Civilization and Culture/Introductory.

##### 17B. Greek Archaeology (3) II. Roller

Lecture—3 hours. Archeological monuments of Geometric, Archaic, and Classical Greece, with special emphasis on the development of cities and sanctuaries. General Education credit: Civilization and Culture/Introductory.

##### 17C. Later Greek and Roman Archaeology (3) III. Roller

Lecture—3 hours. Archeological monuments of the Greek world after the conquests of Alexander the Great, and the monuments of Rome and the Roman Empire. General Education credit: Civilization and Culture/Introductory.

##### \*20. Pompeii AD 79 (4) III. Traill

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. Offered in even-numbered years. General Education credit: Civilization and Culture/Introductory.

##### 30. Greek and Latin Elements in English Vocabulary (3) I, III. The Staff

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.

##### \*31. Greek and Latin Elements in Technical Vocabulary (3) III. The Staff

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.

### Upper Division Courses

##### 140. Homer and Ancient Epic (4) I. The Staff

Lecture—3 hours; term paper. Prerequisite: course 4A or 10 or Comparative Literature 1. Reading of *Iliad*, *Odyssey*, and *Aeneid* in English. Discussion of Homer's and Vergil's techniques of composition, the beliefs and values of their respective societies and the influence of Homer on Vergil. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Classics 4A or 10.

##### 141. Greek and Roman Comedy (4) III. Grimm

Lecture—3 hours; term paper. Prerequisite: course 4A or 10 or Comparative Literature 1. Reading in Aristophanes, Menander, Plautus, and Terence; lectures on the development of ancient comedy. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Classics 4A.

##### \*142. Greek and Roman Novel (4) I. Traill

Lecture—3 hours; term paper. 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*.

##### 143. Greek Tragedy (4) II. Traill

Lecture—3 hours; term paper. Prerequisite: course 4A or 10. Reading in English of selected plays of Aeschylus, Sophocles and Euripides. Lectures on the development and influence of Athenian tragedy. Offered in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Classics 4A or 10.

##### 174. Ancient Greek Sanctuaries (4) III. Roller

Lecture-discussion—4 hours. Prerequisite: course 17B or consent of instructor. The history, cults, and

monuments of Olympia, Delphi, and other sanctuaries. Student reports on major monuments. Offered in even-numbered years.

**\*175. Topography and Monuments of Ancient Athens** (4) III. Roller

Lecture-discussion—4 hours. Prerequisite: course 17A-17B or consent of instructor. The history of Athens as an urban center from the Bronze Age through the late Roman period. Student reports on major monuments with emphasis placed on restoration, chronology, and on the relating of documentary to excavational evidence. Offered in odd-numbered years.

**197TC. Community Tutoring in Classical Languages** (1-5) I, II, III. Grimm

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.)

**Graduate Courses**

**\*201. Introduction to Classical Philology** (4) I.

Thompson

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) II. The Staff

Seminar—3 hours; term paper. Readings in the *Iliad* and *Odyssey*: the origins and transmission of the poems.

**203. Vergil** (4) I. Traill

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) II. Grimm

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) I. Traill

Seminar—3 hours; term paper. Critical examination of the works of Catullus, Horace, or Propertius. May be repeated for credit.

**206. Greek Historiography** (4) III. Thompson

Seminar—3 hours; term paper. Development of historical writing in Greece. May be repeated for credit.

**\*207. Greek Drama** (4) II. Grimm

Seminar—3 hours; term paper. Literary and philological analysis of the plays of Euripides, Sophocles, or Aeschylus. May be repeated for credit.

**299. Research** (1-12) I, II, III. The Staff

Prerequisite: consent of instructor. (S/U grading only.)

**Greek**

**Lower Division Courses**

**1. Elementary Greek** (5) I. The Staff

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.)

**2. Elementary Greek** (5) II. The Staff

Lecture—5 hours. Prerequisite: course 1. Continuation of course 1.

**2NT. Elementary New Testament Greek** (1) II. The Staff

Lecture—1 hour. Prerequisite: course 2 (concurrently). Supplementary study of New Testament Greek.

**3. Intermediate Greek** (5) III. Traill

Lecture—5 hours. Prerequisite: course 2. Continuation of course 2. Selected readings from Greek authors.

**3NT. Elementary New Testament Greek** (1) III. The Staff

Lecture—1 hour. Prerequisite: course 3 (concurrently). Supplementary study of New Testament Greek.

**98. Directed Group Study** (1-5) I, II, III. The Staff (Program Director in Charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses**

**\*100. Ovid** (4) I. Grimm

**Upper Division Courses**

**\*100. Ovid** (4) I. Grimm

Lecture—3 hours; paper. Prerequisite: course 3. Translation and discussion of selected readings from the works of Ovid.

**\*101. Livy** (4) II. Thompson

Lecture—3 hours; term paper. Prerequisite: course 3.

**\*102. Roman Comedy** (5) I. Grimm

Lecture—4 hours; term paper. Prerequisite: course 3.

**103. Vergil: Aeneid** (4) I. Traill

Lecture—3 hours; term paper. Prerequisite: course 3.

**\*104. Sallust** (4) I. Thompson

Lecture—3 hours; term paper. Prerequisite: course 3.

**\*105. Catullus** (4) I. Traill

Lecture—3 hours; term paper. Prerequisite: course 3.

**106. Horace: Odes and Epodes** (4) III. Grimm

Lecture—3 hours; term paper. Prerequisite: course 3.

**\*108. Horace: Satires and Epistles** (4) I. The Staff

Lecture—3 hours; term paper. Prerequisite: course 3.

**\*109. Roman Elegy** (4) III. Grimm

Lecture—3 hours; term paper. Prerequisite: course 3.

**\*110. Caesar** (4) I. Traill

Lecture—3 hours; substantial paper. Prerequisite: course 3. Translation and discussion of selected readings from Caesar. Grammar review and introduction to Latin prose composition.

**\*111A-111B-111C. Silver Age Latin** (4) III. Thompson

Lecture—3 hours; term paper. Prerequisite: course 3. Selections from Tacitus, Pliny, Petronius, Juvenal, Martial, and other writers of the Silver Age.

**112. Cicero: Political Writings** (4) II. Thompson

Recitation—3 hours; term paper. Prerequisite: course 3.

**\*114. Cicero: Philosophical Works** (4) II.

Lecture—3 hours; term paper. Prerequisite: course 3.

**\*115. Lucretius** (4) III. Grimm

Lecture—3 hours; term paper. Prerequisite: course 3.

**\*116. Vergil: Eclogues and Georgics** (4) III.

Lecture—3 hours; term paper. Prerequisite: course 3.

**\*121. Prose Composition** (5) I. Traill

Lecture—4 hours; term paper.

**\*125. Medieval Latin** (4) III. Traill

Lecture—3 hours; term paper. Prerequisite: course 3 and two upper division courses in Latin. 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.

**198. Directed Group Study** (1-5) I, II, III. The Staff

(Program Director in charge) (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Program Director in charge) (P/NP grading only.)

## Clinical Pathology

(School of Veterinary Medicine)

Joseph G. Zinkl, D.V.M., Ph.D., Acting Chairperson of the Department

Department Office, 1319 Haring Hall (916-752-0153)

**Faculty**

James S. Cullor, D.V.M., Ph.D., Assistant Professor

Bernard F. Feldman, D.V.M., Ph.D., Professor Emeritus

Nemi C. Jain, M.V.Sc., Ph.D., Professor

Donald E. Jasper, D.V.M., Ph.D., Professor Emeritus

Jiro J. Kaneko, D.V.M., Ph.D., Professor

Joseph G. Zinkl, D.V.M., Ph.D., Professor

**Part-Time Clinical Faculty**

Robert M. DuFort, D.V.M., Assistant Clinical Professor

John W. Switzer, D.V.M., Associate Clinical Professor

## Courses in Clinical Pathology

### Upper Division Courses

**101. Comparative Hematology** (2) III. Kaneko, Jain, Zink  
Lecture—2 hours. Prerequisite: Biological Sciences 1A, Physiology 110, Biochemistry 101A-101B or Physiological Sciences 101A-101B or consent of instructor. Principles, interpretation, and applications of clinical hematology; comparative blood cellular morphology and function.

**101L. Comparative Hematology Laboratory** (2) III. Kaneko, Zink, Jain  
Laboratory—6 hours. Prerequisite: course 101 (should be taken concurrently) and consent of instructor. Introduction to laboratory methods and procedures of clinical hematology. Limited enrollment.

**102. Clinical Biochemistry** (4) II. Kaneko  
Lecture—3 hours; laboratory—2 hours. Prerequisite: Physiology 112, 113; Physiological Sciences 101A-101B or Biochemistry 101A-101B, or consent of instructor. Principles and methods of clinical biochemical chemistry; determination and interpretation of the biochemical constituents of the blood, urine, and other body fluids.

**199. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

### Graduate Courses

**204. Normal and Abnormal Bone Marrow Cytology** (1) III. Zink  
Lecture-laboratory—2 hours. Prerequisite: Veterinary Medicine 435 or course 101. Normal maturation of hematopoietic cells followed by a study of the cytology of blood and bone marrow in selected diseases of domestic animals including infections, anemias, myeloproliferative disorders and leukemias.

**205. Physiology and Pathology of Leukocytes** (2) III. Jain  
Lecture—2 hours. Prerequisite: course 101, Biochemistry 101A-101B, or consent of instructor. Metabolism, ultrastructure, kinetics, homeostasis, cytochemistry, and functions of different leukocytes; physiological, functional, histochemical, and morphological changes in leukocytes in diseases; their role in inflammatory and immunologic processes. Offered in even-numbered years.

**206. Immunohematology** (2) III. Jain, MacKenzie (Medicine), Culor  
Lecture—2 hours. Prerequisite: course 101, Veterinary Microbiology 126, or consent of instructor. Immunologic aspects of hematology; blood cell antigens and antibodies; autoimmune hematologic diseases; reactions to blood transfusions; transplantation mechanisms. Offered in odd-numbered years.

**254. Pathogenesis of Infectious Disease** (2) III. Culor  
Lecture—2 hours. Prerequisite: upper division or graduate standing in biology or the medical sciences. Introductory courses in microbiology, immunology, hematology, or consent of instructor. Features of pathogenicity and host defense mechanisms common to infection with bacteria; viruses, fungi, and protozoa are emphasized as well as the important species-related differences. Perinatal immune responses of dam and offspring are also covered. Offered in even-numbered years.

**298. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

**299. Research in Clinical Pathology** (1-12) I, II, III. The Staff (S/U grading only.)

## Clinical Psychology

See Medicine, School of

## Communication

See Rhetoric and Communication

## Community Development (A Graduate Group)

Mark Francis, Ph.D., Chairperson of the Group  
Group Office, 103 AOB 4 (Applied Behavioral Sciences), (916-752-4360 a.m. only)

**Faculty.** The interdisciplinary faculty include those in Anthropology, Asian American Studies, African American Studies, Landscape Architecture, Environmental Design, Geography, Psychology, Sociology, and Women's Studies.

**Graduate Study.** The Graduate Group in Community Development offers a multidisciplinary program of study which leads to the M.S. degree under both master's degree plans, the thesis or the comprehensive examination. The program is designed to prepare students for professional roles as administrators, designers, planners, researchers, or technicians with some emphasis upon rural, nonmetropolitan communities and human service organizations. Training in community development is also aimed at preparing an individual to work within government or non-profit organizations in the realm of social and economic change. There is opportunity available for specialization in: (1) housing and the spatial environment, (2) minority communities, (3) women's issues in the community, (4) community health and human services, (5) environmental issues, and (6) rural and agricultural issues.

**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, cultural geography, or political science, and courses in community studies.

**Graduate Advisers.** I. Fujimoto, S. McNeil, M. Wells.

## Community Health

See Medicine, School of

## Community Nutrition

(College of Agricultural and Environmental Sciences)

### The Major Program

Community Nutrition focuses on the behavioral, economic, and sociocultural factors that influence dietary practices and nutritional status of individuals and groups. The aim of Community Nutrition is the application of this knowledge in the development and implementation of programs to improve the nutritional status in the community. The major is designed for students who seek to combine a foundation in the biological and nutritional sciences with study in the social sciences. All students in the major are required to complete a common core of preparatory and depth subject matter courses. Students select one of three subject matter options emphasizing sociocultural, psychological, or economic

aspects of food, diet, and nutrition, and an additional area of concentration in consultation with the adviser.

### B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

	UNITS
<b>Written/Oral Expression</b> .....	<b>7-8</b>
See College requirement .....	7-8
<b>Preparatory Subject Matter</b> .....	<b>49-50</b>
Biological sciences (Biological Sciences 1A, 1B, 1C) .....	15
Chemistry (Chemistry 1A, 1B, 8A, 8B) .....	16
Computer science (Agricultural Science and Management 21 or Sociology 40) .....	2-3
Cultural food habits (Nutrition 20) .....	4
Cultural social science (Anthropology 2, Geography 2, or Sociology 3) .....	4
Social research methods (Sociology 46A or Psychology 41) .....	4
Statistics (Sociology 46B, Statistics 13) .....	4
<b>Breadth/General Education</b> .....	<b>6-24</b>
Satisfaction of General Education requirement .....	6-24
(Note that some of the Option Subject Matter may meet General Education requirements)	
<b>Depth Subject Matter</b> .....	<b>52-53</b>
Biochemistry 101A-101B or Physiological Sciences 101A-101B .....	6-7
Food Science and Technology 100A, 100B, 101A, 101B .....	10
Nutrition 110, 111, 112, 113, 116A, 116B, 118, 120, 190 .....	27
Nutrition 192 .....	2
Physiology 110, 110L .....	7
<b>Option Subject Matter</b> .....	<b>28-32</b>
Course work chosen from one of the following three options in consultation with adviser .....	18-20
Additional units in a related social or health science chosen in consultation with adviser .....	10-12
(May include a minor program in fields such as physical education, environmental toxicology, community development, statistics or the social sciences.)	
<b>Behavioral-Psychological Option</b>	
Psychology 1, Education 110 or Psychology 130 .....	
Psychology 112 or Human Development 100A or 100B .....	
Psychology 115 or Human Development 100C .....	
Psychology 108, 129, 145, 165, 168, 180A, 180B, 180C .....	
Applied Behavioral Sciences 173, 178 .....	
Consumer Science 100 .....	
Food Science and Technology 107, 117 .....	
Sociology 154 .....	
Anthropology 129, 130 .....	
Rhetoric and Communication 115 .....	
<b>Economics and International Development Option</b>	
International Agricultural Development 10 .....	
Economics 1A, 1B .....	
Mathematics 16A .....	
Agricultural Economics 100A, 100B, 120, 130, 141 .....	
International Agricultural Development 103, 110A, 110B, 195 .....	
Economics 100, 101, 115A, 115B, 118, 123, 130, 162 .....	
Consumer Science 100 .....	
Anthropology 122, 126 .....	
Sociology 170 .....	
Economics 151A .....	
Environmental Studies 1, 165 .....	
Rhetoric and Communication 115 .....	

**Sociocultural Option**

Foreign language (10 units or the equivalent strongly recommended)  
 Anthropology 101, 126, 133, 135  
 Geography 170, 175  
 Afro-American Studies 100  
 Applied Behavioral Sciences 2  
 Rhetoric and Communication 115  
 Regional courses, choose 8 units from one of the following four areas (alternative courses may be selected in consultation with the adviser)  
**North America:** Anthropology 141A, 141C, 176, Geography 121, History 169A, 169B, Sociology 143A, 143B  
**Central and South America:** Geography 122A, 122B, History 161A, 161B, 162, 163A, 163B, 165, 166A, 166B, 168  
**Africa:** Anthropology 140A, 140B, Geography 125A, 125B, History 115A, 115B, 115C  
**Asia:** Anthropology 142, 147, 148, 149, Geography 124, 127, History 137A, 137B, 137C, 138, 190A, 190B, 190C, 191A, 191B, 193, 194A, 194B, 194C, 195

**Additional Recommended Courses**  
 Applied Behavioral Sciences 151, 152, Community Health 101, 160, 180, 194, Environmental Studies 126, Nutrition 113, 114, 116AL, 116BL, 117, 129, 190, 192, 199, 219, Sociology 106

**Unrestricted Electives** ..... 13-38  
**Total Units for Degree** ..... 180

**Major Adviser.** K.G. Dewey (*Nutrition*).

**Advising Center** for the major is located in 1151 Meyer Hall (916-752-2512).

**Internship.** To fulfill the academic requirements for an internship in Dietetics, the following courses must be included: Economics 1B, Agricultural Economics 112, Food Service Management 120, 120L, 121, 122, 123, Applied Behavioral Sciences 173 or Education 110, Psychology 1, Nutrition 116AI-116BL, and Rhetoric and Communication 1. Consult the Advising Center prior to the first quarter of the junior year for information on procedures.

**Graduate Study.** For information on graduate study, see the Graduate Division section in this catalog.

Margaret Bedrosian, Ph.D., Lecturer  
 Marc Eli Blanchard, Agrégé de Lettres, Professor (*French*)  
<sup>4</sup>Ruby Cohn, Ph.D., Professor (*Comparative Literature; Dramatic Art*)  
 Gail Finney, Ph.D., Professor (*Comparative Literature, German*)  
<sup>1</sup>Michele Hannoosh, Ph.D., Assistant Professor (*Comparative Literature, French*)  
 Roland W. Hoermann, Ph.D., Professor (*Comparative Literature, German*)  
 Manfred Kusch, Ph.D., Associate Professor (*Comparative Literature, French*)  
<sup>3,4</sup>Kari Lokke, Ph.D., Assistant Professor (*Comparative Literature, English*)  
 Donna K. Reed, Ph.D., Lecturer  
 Peter M. Schaeffer, Ph.D., Professor (*German*)  
<sup>2,3</sup>Robert M. Torrance, Ph.D., Professor  
<sup>3</sup>Marian B. Ury, Ph.D., Professor  
 Michelle Yeh, Ph.D., Assistant Professor

**The Major Program**

Few people would think of studying only English physics, German biology, French painting, or Spanish music. Yet most literature majors study books originally written in a single language. Comparative Literature, on the other hand, encourages students to read, think about, and compare books from different national languages and from different parts of the world—from Italy and Russia as well as England and the United States, and from Asia, Africa, and Latin America as well as North America and Europe.

Comparative Literature thus enlarges students' horizons by bridging the divisions between national cultures instead of concentrating on a single tradition. Both the major and minor programs allow students to combine courses in one or more national literature departments together with courses in Comparative Literature. Students who enjoy reading books, exploring ideas, and learning about different civilizations will find Comparative Literature a stimulating field of study.

The introductory course sequence, "Great Books of Western Civilization," provides both an overview of European literary culture from ancient times to the present and intensive practice in analytical thought and English composition. 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. No foreign language is required for the minor.

Students majoring in Comparative Literature choose a first and a 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 between literature and philosophy, psychology, history, and the arts. Each student's plan of study must be approved by an adviser at the beginning and end of each academic year.

**Career Alternatives.** Careers directly related to Comparative Literature include teaching, journalism, publishing, and translating. Most Comparative Literature majors, however, are preparing for other careers that will employ the skills they have learned in the process of acquiring a stimulating and enriching education. The major in Comparative Literature gains useful experience in one or more foreign languages, in careful analytical thinking, and in precise use of the English language. Because many professional schools consider a literature major an excellent background for their graduate disciplines, Comparative Literature provides valuable preparation (along with supplementary courses outside the major) for careers in business, government, medicine, or law.

**Comparative Literature**

(College of Letters and Science)

Gail Finney, Ph.D., Program Director

Program Office, 922 Sproul Hall (916-752-9934)

**Committee in Charge**

Samuel G. Armistead, Ph.D. (*Comparative Literature, Spanish*)  
<sup>4</sup>Ruby Cohn, Ph.D. (*Comparative Literature, Dramatic Art*)  
 Gail Finney, Ph.D. (*Comparative Literature, German*)  
<sup>1</sup>Michele Hannoosh, Ph.D. (*Comparative Literature, French*)  
 Roland W. Hoermann, Ph.D. (*Comparative Literature, German*)  
 Manfred Kusch, Ph.D. (*Comparative Literature, French*)  
<sup>3,4</sup>Kari Lokke, Ph.D. (*Comparative Literature, English*)  
<sup>2,3</sup>Robert M. Torrance, Ph.D. (*Comparative Literature*)  
<sup>3</sup>Marian B. Ury, Ph.D. (*Comparative Literature*)  
 Karl F. Zender, Ph.D. (*English*)

**Faculty**

Samuel G. Armistead, Ph.D., Professor (*Comparative Literature, Spanish*)  
 William E. Baker, Ph.D., Professor (*English*)

**A.B. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter</b> ..... 12-42	
Comparative Literature 1, 2, 3, ..... 12	
Foreign language: sufficient preparation to insure satisfactory performance at the upper division level ..... 0-30	
<b>Depth Subject Matter</b> ..... 40	
Five upper division courses (including at least three in a language other than English) distributed between the first and second literatures of concentration with the approval of the adviser ..... 20	
Comparative Literature 141 ..... 4	
Two additional upper division Comparative Literature courses, including at least one in a major literary period (such as 164A-D), genre (such as 160A-B, 161A-B, or 166A-B), or movement (such as 168A-C or 169) ..... 8	
Two additional upper division courses in one or both literatures of concentration or in Comparative Literature, selected with the approval of the adviser ..... 8	
<b>Total Units for the Major</b> ..... 52-62	

**Recommended**

Art 10H; Dramatic Art 20; Classics 10; History 4A, 4B, 4C; Philosophy 21, 22, 23.

**Major Adviser.** Michele Hannoosh (*Comparative Literature, French*).

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 Program.** Candidates for high or highest honors in Comparative Literature must write a senior thesis under the direction of a faculty member approved by the Program Director. 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. Only students who have attained a cumulative GPA of 3.5 in all courses satisfying the major (except elementary foreign language courses) at the end of the junior year will be eligible for the honors program.

**Minor Program Requirements:**

The minor in Comparative Literature allows students to combine courses in Comparative Literature with courses in one or two national literatures, including English and foreign literatures in translation. There is no foreign language requirement for the minor.

**Comparative Literature** ..... 24

Comparative Literature 1, 2, or 3 ..... 4

At least two upper division Comparative Literature courses (Comparative Literature 141 strongly recommended) ..... 8

Three additional upper division courses in one or two national literatures (including English) or in Comparative Literature ..... 12

Courses should form a coherent program and should be chosen in consultation with, and with the approval of, the adviser.

**Minor Adviser.** Same as Major Adviser.

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.

**Teaching Credential Subject Representative.** Michele Hannoosh. See also the Teacher Education Program.

**Graduate Study.** Refer to Comparative Literature (A Graduate Group). See also the Graduate Division section in this catalog.

## Courses in Comparative Literature

### Lower Division Courses

#### 1. Great Books of Western Civilization: From

**Myth to Faith** (4) I, II, III. Director in charge  
Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from *The Epic of Gilgamesh* to St. Augustine's *Confessions*. General Education credit: Civilization and Culture/Introductory.

#### 2. Great Books of Western Civilization: From

**Faith to Reason** (4) I, II, III. Director in charge  
Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from Dante's *Inferno* to Swift's *Gulliver's Travels*. General Education credit: Civilization and Culture/Introductory.

#### 3. Great Books of Western Civilization: The Modern Crisis

(4) I, II, III. Director in charge  
Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. An introduction, through class discussion and frequent written assignments, to some of the great books of western civilization from Goethe's *Faust* to Beckett's *Waiting for Godot*. General Education credit: Civilization and Culture/Introductory.

#### \*4. The Short Story and Novella

(4) II. Ury  
Lecture-discussion—3 hours; term paper. An introduction to shorter forms of prose fiction by major authors of different countries, with especial emphasis on the modern period.

#### 5. Fairy Tales, Fables, and Parables

(3) I, II. Reed  
Lecture-discussion—3 hours. An introduction to fairy tales, fables, and parables as recurrent forms and motifs in literature, with readings from such diverse writers as Aesop and Grimm, Chaucer and Shakespeare, Kafka and Borges. General Education credit: Civilization and Culture/Introductory.

#### 6. Myths and Legends

(3) II, III. The Staff  
Lecture-discussion—3 hours. An introduction to the comparative study of myths and legends, excluding those of Greece and Rome, with readings from Near Eastern, Teutonic, Celtic, Indian, and Japanese literary sources. General Education credit: Civilization and Culture/Introductory.

#### 7. Literature of Fantasy and the Supernatural

(3) I, III. Hoermann, Reed  
Lecture-discussion—3 hours. An inquiry into the interrelations between the fantastic and the real in the literature of dream and hallucination, fabulous landscapes and voyages, grotesque satire, and gothic horror. General Education credit: Civilization and Culture/Introductory.

#### 8. Utopias and their Transformations

(4) II. Hoermann  
Lecture-discussion—3 hours; term paper. Prerequisite: English A. A consideration, in literary works from different ages, of visionary and rational variations on the perfection of a lost paradise, Golden Age, or Atlantis—and of the inhuman nightmares that occasionally result from perversions of the utopian dream. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

#### 10A-N. Master Authors in World Literature

(2) I, II, III. The Staff (Director in charge)  
Lecture-discussion—1 two-hour session. 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: (A) *Gilgamesh*, *Ramayana*, *Beowulf*, *Nibelungenlied*; (B) *Metamorphoses*, *Decameron*, *Arabian Nights*, *Canterbury Tales*; (C) *Chanson de Roland*, *El Cid*, *Igor's Campaign*, *Morte D'Arthur*; (D) *Sakuntala*, *Tristan and Isolde*, *Aucassin and Nicolette*, *Gawain and the*

*Green Knight*; (E) *Swift*, *Rabelais*, *La Celestina*, *Simplicissimus*; (F) *Cervantes*, *Saikaku*, *Fielding*, *Voltaire*; (G) *Machiavelli*, *Shakespeare*, *Lope de Vega*/*Calderon*, *Molière*/*Racine*, *Lessing*/*Schiller*; (H) *Goethe*, *Byron*, *Stendhal*, *Pushkin*, *Lermontov*; (I) *Hoffmann*, *Gogol*, *Poe*, *Hawthorne*, *Maupassant*, *Chekhov*, *Melville*; (J) *Flaubert*, *Twain*, *Turgenev*, *Galdos*, *Ibsen*; (K) *Balzac*, *Dostoevski*/*Tolstoi*, *Hardy*, *Shaw*, *Strindberg*; (L) *Unamuno*, *Svevo*, *Conrad*, *Gide*, *Kafka*, *Faulkner*; (M) *Rilke*/*Yeats*, *Joyce*/*Woolf*, *Mann*/*Celine*, *Bulgakov*/*Tanizaki*, *O'Neill*/*Brecht*, *Lorca*/*Pirandello*; (N) *Camus*/*Sartre*, *García Márquez*/*Grass*, *Borges*/*Sarratea*, *Bellow*/*Nabokov*, *Beckett*/*Pinter*, *Genet*/*Dürrenmatt*. May be repeated for credit in different subject area. Limited enrollment. (P/NP grading only.)

#### 12. Introduction to Women Writers

(4) II, III. Lokke  
Lecture-discussion—3 hours; term paper. Prerequisite: completion of Subject A 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. Students will practice literary analysis of voice, imagery, narrative strategies and diction. General Education credit: Civilization and Culture/Introductory.

#### \*13. Dramatic Literature

(3) III. Cohn  
Lecture—3 hours. Prerequisite: Subject A or the equivalent. Introduction, through careful reading of selected plays, to some of the major forms of drama, from the earliest tragedies of ancient Greece to the contemporary American theater. Offered in odd-numbered years. General Education credit: Civilization and Culture/Introductory.

#### \*15. The Spiritual Quest

(3) I. Torrance  
Lecture-discussion—3 hours. An exploration of the unending search to discover—or to create—a transcendent meaning and purpose in human life, as reflected in such works as the *Bhagavad Gita*, *The Quest of the Holy Grail*, *Dante's Purgatory*, and *Melville's Moby Dick*.

#### 20. Man and the Natural World

(4) I, III. The Staff  
Lecture-discussion—3 hours; term paper. Examination of the changing relationship between the individual human being and his "natural" environment, whether cultivated or wild, as reflected in literary works from ancient times to the present by such authors as Hesiod, Virgil, Rousseau, Wordsworth, and Thoreau. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

#### 25. Ethnic Minority Writers in World Literature

(4) I, III. Bedrosian  
Lecture—3 hours; term paper. 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. General Education credit: Civilization and Culture/Introductory.

#### \*53A. Literature of China and Japan

(3) II. Ury  
Lecture—2 hours; discussion—1 hour. 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*.

#### \*53B. Literature of India and Southeast Asia

(3) II. Ury  
Lecture—2 hours; discussion—1 hour. 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.

#### 98. Directed Group Study

(1-5) I, II, III. The Staff (Director in charge)  
Restricted to lower division students. (P/NP grading only.)

#### 99. Special Study for Undergraduates

(1-5) I, II, III. The Staff (Director in charge)

(P/NP grading only.)

### Upper Division Courses

#### 135. Women Writers

(4) I, III. Lokke, Reed  
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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

#### 140. Thematic and Structural Study of Literature

(4) I. Yeh  
Lecture-discussion—3 hours; term paper. Interpretation of selected works illustrating the historical evolution of themes, as well as of formal and structural elements.

#### 141. Literary Theory and Criticism

(4) III. Torrance  
Lecture-discussion—3 hours; term paper. Exploration of literary theories with emphasis on specific objectives and possibilities of comparative literature. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

#### \*142. Critical Reading and Analysis

(4) III. The Staff (Director in charge)  
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.

#### \*145. Representations of the City

(4) I. Hannosh  
Lecture-discussion—3 hours; term paper. Examination of the portrayal of the modern city in 19th and 20th century western literature. Readings include works by Balzac, Dickens, Poe, Baudelaire, Dostoevsky, Whitman, Zola, T.S. Eliot, and William Carlos Williams.

#### 146. Myth in Literature

(4) III. Schaeffer  
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.

#### 153. The Forms of Asian Literature

(4) III. Ury  
Lecture-discussion—3 hours; term paper. Prerequisite: upper division standing. 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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from GE Literature Preparation List.

#### 157. War and Peace in Literature

(4) II. Blanchard  
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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

#### \*158. The Detective Story as Literature

(4) I. The Staff  
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.

#### \*159A-G. Special Topics in Comparative Literature

(4) I, II, III. The Staff (Director in charge)  
Lecture-discussion—3 hours; term paper. Intensive study of selected subjects: (A) The Play Within the Play; (B) The Lyrical Novel; (C) Women in Literature; (D) The Role of Philosophy in Literature; (E) The Role of Psychology in Literature; (F) The Religious Experience in Literature; (G) Literary Attitudes and Judgment. May be repeated for credit in different subject area. General Education credit 159C: Civi-

lization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**160A. The Modern Novel** (4) I. Finney, Reed  
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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**160B. The Modern Drama** (4) I. Cohn  
Lecture-discussion—3 hours; term paper. Readings in representative authors such as Ibsen, Strindberg, Chekhov, Pirandello and Brecht. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**\*161A. Tragedy** (4) I. Cohn  
Lecture-discussion—3 hours; term paper. Persistent and changing aspects of the tragic vision in literature from ancient times to the present. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**\*161B. Comedy** (4) II. Cohn  
Lecture-discussion—3 hours; term paper. Comic attitudes towards life in literary works of different ages. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**163. Biography and Autobiography** (4) I. Ury  
Lecture-discussion—3 hours; term paper. Portrayals of a human life in biographies and/or autobiographies of different countries and ages. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**\*164A. The Middle Ages** (4) III. Armistead  
Lecture-discussion—3 hours; term paper. Readings in heroic epics, chivalric romances, and such major authors as Dante and Chaucer, with emphasis on shared assumptions concerning man's place in the world. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**\*164B. The Renaissance** (4) II. Torrance  
Lecture-discussion—3 hours; term paper. Readings in major authors such as Petrarch, Machiavelli, Erasmus, Montaigne, Rabelais, Cervantes, and Shakespeare, with particular emphasis on changing conceptions of the possibilities and limitations of man. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**\*164C. Baroque and Neoclassicism** (4) III. Torrance  
Lecture-discussion—3 hours; term paper. Readings in major authors such as Calderon, 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.

**164D. The Enlightenment** (4) II. Kusch  
Lecture-discussion—3 hours; term paper. Readings in major authors such as Swift, Voltaire, Rousseau, Sterne, and Kant, with emphasis on philosophical ideas and literary forms. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**166A. The Epic** (4) II. Armistead  
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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**\*166B. The Novel** (4) II. The Staff  
Lecture-discussion—3 hours; term paper. Readings in various forms of the novel such as the picaresque, the developmental, and the confessional, with

emphasis on the evolution of the genre. May be repeated for credit in different subject area. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**\*167. Comparative Study of Major Authors** (4) I.  
The Staff  
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.

**168A. Romanticism** (4) III. The Staff  
Discussion—3 hours; term paper. Prerequisite: any introductory course in literature. 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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**\*168B. Realism and Naturalism** (4) III. Finney  
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 even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**169. The Avant-Garde** (4) II. Cohn  
Lecture-discussion—3 hours; term paper. Studies in movements such as surrealism, expressionism and the absurd. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**\*170. The Contemporary Novel** (4) II. Torrance  
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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**194H. Special Study for Honors Students** (1-5) I., II., III. The Staff (Director in charge)  
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. (P/NP grading only.)

**197T. Tutoring in Comparative Literature** (2-4) I., II., III. Hoermann  
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) I., II., III. The Staff (Director in charge) (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I., II., III. The Staff (Director in charge) (P/NP grading only.)

### Graduate Courses

**200. Introduction to the Graduate Study of Comparative Literature** (4) I. Finney  
Seminar—3 hours; research paper. Prerequisite: reading knowledge of one foreign language. Introduction to research tools, library resources, and critical concerns of Comparative Literature, with focus on the comparative study of a single work, culminating in a related research project.

**201. Theories of Comparative Literature** (4) III. Torrance  
Seminar—3 hours; research paper. Prerequisite: reading knowledge of one foreign language; course 141 or the equivalent recommended. An examination of international theories of literature with reference to language, genre, thematics, social and historical context.

**250A. Research in Comparative Literature** (4) I., II., III. The Staff (Director in charge)  
Individual instruction—1 hour. Prerequisite: course 200. Individually guided research, under the supervision of a faculty member, in a comparative topic culminating in a term paper. Required of M.A. and Ph.D. candidates.

**250B. Research in Comparative Study of Author, Period, or Genre** (4) I., II., III. The Staff (Director in charge)  
Individual instruction—1 hour. Prerequisite: course 200 and 201. Individually guided research, under the supervision of a faculty member, in the specialized study of an individual author, historical period, or literary genre culminating in a term paper. Required of Ph.D. candidates.

**250C. Basic Research for the Dissertation** (4) I., II., III. The Staff (Director in charge)  
Individual instruction—1 hour. Prerequisite: course 200 and 201. Individually guided research, under the supervision of a faculty member, in preparation for the dissertation in Comparative Literature. Required of Ph.D. candidates.

**298. Directed Group Study** (1-5) I., II., III.  
Prerequisite: graduate standing. (S/U grading only.)

**299. Individual Study** (1-12) I., II., III. The Staff (Director in charge) (S/U grading only.)

**299D. Special Study for the Doctoral Dissertation** (1-12) I., II., III. (S/U grading only.)

### Professional Courses

**390. Teaching Comparative Literature in College** (3) I. The Staff  
Lecture—1 hour; discussion—2 hours. Methods of teaching Comparative Literature with specific application to the introductory courses 1, 2, and 3, in relation to major cultural and social developments. Discussion also of ways to teach analytical writing. (S/U grading only.)

**392. Teaching Internship in Comparative Literature** (1) I., II., III. The Staff  
Discussion—1 hour. Regular consultations between the student instructor teaching Comparative Literature courses and a supervisor. In-class evaluation of teaching. May be repeated for credit after consultation with supervisor. (S/U grading only.)

## Comparative Literature (A Graduate Group)

Gail Finney, Ph.D., Chairperson of the Group, (916-752-8411)

Group Office, 922 Sproul Hall (916-752-2239)

**Graduate Study.** The Comparative Literature Program offers the M.A. and Ph.D. degrees with a strong emphasis on individual research under the supervision of a faculty member. The M.A. degree is awarded under Plan II (see Graduate Division section in this catalog). Candidates for the M.A. combine study of Comparative Literature with study of two literatures (one of which may be English or American) in the original languages. Ph.D. candidates, in addition to further research of a comparative nature, study three literatures (one of which may be English and/or American), acquiring an extensive knowledge of the overall development of one. Within this framework, each student's program will be tai-

lored to individual interests, and may center on a major historical period, such as the Renaissance or the modern age; a genre, such as poetry, drama, or the novel; or any other special emphasis approved by the Graduate Adviser.

**Preparation.** For admission to the Program, M.A. candidates should have an undergraduate major in literature and reading ability in one foreign language. Ph.D. candidates should have an undergraduate major in literature and reading ability in two 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.** Gail Finney (*Comparative Literature, German*).

## Comparative Pathology (A Graduate Group)

Joseph G. Zinkl, D.V.M., Ph.D., Chairperson of the Group

Group Office, 1126 Haring Hall (916-752-1385)

**Graduate Study.** The Graduate Group in Comparative Pathology offers the M.S. and Ph.D. degrees for graduate study in disciplines concerned with disease processes. The focus of the Group is on the study of the causes and nature of disease processes in animals and humans. Major emphasis is on the mechanisms responsible for the development of diseases at the organismal, cellular or subcellular level. To this study is brought a wide array of scientific disciplines so that students with divergent interests can be accommodated in programs designed for individual needs.

This program is primarily designed for students who have a professional medical degree, i.e., D.V.M., M.D., D.D.S. Students without a professional degree will not be considered unless they have an especially strong background in basic biomedical sciences.

Beyond core courses selected from disciplines such as anatomy, bacteriology, genetics, immunology, parasitology, pathology, physiology, and virology, course programs are intentionally very flexible. The goal is to specialize in one field of principal interest and attain competence in one or more related areas.

**Graduate Adviser.** D. L. Dungworth (*Pathology*).

## Computer Science

See Computer Science; Computer Science (A Graduate Group); Engineering: Computer Science; and Engineering: Electrical and Computer Science

## Computer Science

(College of Letters and Science)

### The Major Program

The Computer Science major is designed to prepare students for careers involving the design of computer systems and their application to science, industry and management. Students taking this major receive solid grounding in fundamentals of languages, operating systems, and the formal mathematical tools

required to use the computer in solving complex tasks in today's society. Emphasis in this major is on software, although introductory architecture is included. The program provides opportunities for students to choose electives both in the College of Letters and Science and in the College of Engineering. The program will prepare students for advanced work in computer science or in other disciplines requiring advanced knowledge of the use of computers.

For students interested in the engineering aspects of computer science, see Engineering: Computer Science.

### B.S. Major Requirements:

Preparatory Subject Matter	48
Computer Science Engineering 30 or 30H,	
40 or 40H.....	8
Electrical and Computer Science Engineering 70 .....	4
Mathematics 21A-21B-21C, 22A-22B.....	18
Statistics 32 .....	3
One series from the following four .....	15
(a) Chemistry 1A-1B-1C	
(b) Chemistry 1A-1B and Biological Sciences 1A	
(c) Chemistry 4A-4B-4C	
(d) Physics 9A-9B-9C and Mathematics 22C	

Depth Subject Matter	54
Computer science, core courses.....	25
Computer Science Engineering 100, 110, 120, 122, 140, 150,	
Electrical and Computer Science Engineering 171	
Computer science electives.....	14
Minimum of 14 units from Computer Science Engineering 142, 152, 160, 165, 168, 170, 172, 175, 199 (maximum 3 units), Electrical and Computer Science Engineering 176, 177, 182A-182B	
Upper division mathematics .....	15
Minimum of 15 units of approved upper division courses in mathematics and/or statistics. Any upper division course in mathematics or statistics is approved for this requirement <i>except</i> the following:	
Mathematics 108 and any mathematics course numbered above 188	
Any statistics course numbered below 131 or above 188	

Total Units for the Major	102
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**Major Advisers.** M. Archer, G. Fisher, R. Olsson (*Computer Science*).

**Graduate Study.** See the Graduate Division section in this catalog.

## Computer Science (A Graduate Group)

Robert M. Keller, Ph.D., Chairperson of the Group  
Group Office, 4455 Chemistry Annex (Division of Computer Science) (916-752-7224)

**Faculty.** Consists primarily of faculty members from the Division of Computer Science, the Department of Electrical Engineering and Computer Science, the Department of Engineering: Applied Science (Livermore), the Department of Mathematics, and the Graduate School of Management.

**Graduate Study.** The Graduate Group in Computer Science offers programs of study leading to the M.S. and Ph.D. degrees in Computer Science. Research strengths lie in artificial intelligence, computer architecture, computer networks, computer systems design, database systems, computer graphics, programming languages, operating systems, perfor-

mance evaluation, robotics, scientific computation, software engineering, and theory.

**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 written examinations in three areas of specialization as defined by the Graduate Group. Ph.D. candidates must pass preliminary written examinations in three of the following four areas: programming languages/compilers, operating systems, computer science theory, and computer architecture. The candidates must also pass a qualifying oral examination and complete a dissertation demonstrating original research in an area approved by the Graduate Group.

**Graduate Advisers.** P. Linz, N.S. Matloff.

## Consumer Economics

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of Agricultural Economics.

**Major Program and Graduate Study.** See the major in Agricultural and Managerial Economics; and for graduate study, see the Graduate Division section in this catalog.

**Related Courses.** See Agricultural Economics.

### Courses in Consumer Economics

Questions pertaining to the following courses should be directed to the instructor or to the Department of Agricultural Economics, Advising Office, University House Annex.

#### Upper Division Courses

**142. Personal Finance** (3) I. Shepard; III. B. Butler; Summer Session

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. (Same course as Agricultural Economics 142.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

#### Graduate Courses

**290. Seminar** (1) I, II, III. The Staff

Seminar—1 hour. Current issues in consumer economics and the economics of consumption.

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

## Consumer Food Science

(College of Agricultural and Environmental Sciences)

### The Major Program

The Consumer Food Science major emphasizes both the biological properties of foods and the socioeconomic and cultural aspects of foods as they relate to consumer acceptability and use. Students are provided with sufficient range in study of the biological, natural, and social sciences to prepare them for careers such as food product development, quality assurance, marketing and sensory analysis, extension service, consumer communication, and community service. The major provides academic preparation for those who plan to pursue similar careers or to undertake graduate study in Food Science or Nutrition.

### B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

UNITS

<b>Written/Oral Expression</b> .....	<b>7-8</b>
See College requirement .....	7-8
<b>Preparatory Subject Matter</b> .....	<b>54-55</b>
Biochemistry (Biochemistry 101A-101B or Physiological Sciences 101A-101B).....	6-7
Biological science (Biological Sciences 1A).....	5
Chemistry (Chemistry 1A-1B-1C, 8A-8B).....	21
Computer science (Agricultural Science and Management 21).....	3
Microbiology (Microbiology 102, 102L) ....	6
Physics (Physics 10) .....	4
Physiology (Physiology 110) .....	5
Statistics (Agricultural Science and Management 150).....	4
<b>Breadth/General Education</b> .....	<b>17-29</b>
Satisfaction of General Education requirement to include:	
Economics (Economics 1A-1B) .....	10
<b>Depth Subject Matter</b> .....	<b>56</b>
Agricultural economics (Agricultural Economics 112, 141) .....	8
Community Nutrition (Nutrition 118, 20 or 120) .....	7
Consumer Science (Consumer Science 100, 135) .....	6
Food Science and Technology (100A, 100B, 101A, 101B, 104, 107, 111, 128) .....	24
Human nutrition with laboratory (Nutrition 110, 111, 112 or 113) .....	11
<b>Restricted Electives</b> .....	<b>20</b>
Food and consumer related courses selected in accordance with student's educational goal with approval of adviser.	
<b>Unrestricted Electives</b> .....	<b>12-26</b>
<b>Total Units for the Degree</b> .....	<b>180</b>

### Recommended

It is recommended that students interested in graduate work take Chemistry 5, English 104, Mathematics 16A-16B-16C and Physics 6A-6B-6C.

**Major Adviser.** H.G. Schutz (*Textiles and Clothing*).

**Advising Center** for the major is located in 128 Cruess Hall (916-752-1468).

**Graduate Study.** Related graduate study and research leading to the M.S. degrees in Food Science or Nutrition is available. See also the Graduate Division section in this catalog.

## Consumer Science

(College of Agricultural and Environmental Sciences)

**Faculty.** See under the Division of Textiles and Clothing, and the Departments of Agricultural Economics and Food Science and Technology.

**Major Programs and Graduate Study.** Consumer Food Science is a related major. For graduate study, see the Graduate Division section in this catalog.

**See Consumer Economics, Food Science and Technology, Nutrition, and Textiles and Clothing.**

### Courses in Consumer Science

*Questions pertaining to the following courses should be directed to the Division of Textiles and Clothing Advising Office, 129 Everson Hall.*

#### Lower Division Courses

**\*47. Food Product Development Field Study** (1) III. Discussion—three 2-hour sessions; field trip—2 days. To observe commercial aspects of the large-scale development, distribution and evaluation of food products intended for human consumption. Course given between Winter and Spring Quarters. Advance enrollment with instructor required Winter quarter. (P/NP grading only.)

**\*92. Internship in Consumer Science** (1-12) I, II, III.

The Staff

Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-learn experience on and off campus in a consumer science related area. (P/NP grading only.)

#### Upper Division Courses

**100. Consumer Behavior** (3) I. The Staff

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 model to help guide and understand consumer research will be presented. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: any introductory GE course in psychology, economics, or sociology.

**\*135. Principles of Food Product Development** (3) I.

Lecture—3 hours. Prerequisite: one course in introductory food science. Presents basic concepts of product research and development. Organization, activities, new product development, project management. Role of food regulations, consumerism, marketing, advertising, consumer research.

**190. Current Topics in Consumer Research** (1) III.

Sommer

Seminar—1 hour; term paper. Prerequisite: upper division standing. One-hour presentations, including time for questions and discussion, by guest speakers from on and off-campus on research findings and practical projects in consumer studies. May be repeated once for credit. (P/NP grading only.)

**\*192. Internship in Consumer Science** (1-12) I, II, III. The Staff

Laboratory—3-36 hours. Prerequisite: completion of a minimum of 84 units; consent of instructor. Work-learn experience on and off campus in a consumer science related area. (P/NP grading only.)

**\*198. Directed Group Study** (1-5) I, II, III. The Staff (P/NP grading only.)

**\*199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (P/NP grading only.)

#### Graduate Courses

**\*200. Consumer Research Methods** (3) II.

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Topics will include consumer laboratory and field attitude research, consumer sampling, measurement techniques, scales and methods of analysis.

**\*299. Research** (1-12) I, II, III. (S/U grading only.)

## Consumer Technology

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of Agricultural Engineering.

### Courses in Consumer Technology

*Questions pertaining to the following courses should be directed to the instructor or the Department of Agricultural Engineering, 2030 Bainer Hall.*

#### Lower Division Courses

**15. Experiments in Creative Woodworking** (1) III. Grismer

Laboratory—2 hours. Experimental comparison of techniques for creating objects and structures of wood. Physical principles and properties of woods as related to structural stability, selection and use of tools, and aesthetics in design; finishes to preserve, enhance, or create effects.

**16. Experiments in Creative Metalworking** (2) III. J. Rumsey

Lecture—1 hour; laboratory—2 hours. Prerequisite: Chemistry 1A and Physics 5A recommended. Experimental comparisons of techniques for creating objects and structures of metal. Physical principles; design considerations; effects of techniques on quality and appearance; bases for self evaluation of skills. Layout, cutting, forming, welding and finishing. (P/NP grading only.)

**17. Electrical Appliances and Systems** (2) III.

Lecture—1 hour; laboratory—3 hours. Characteristics and principles of electrical appliances and systems for lighting, heating, and power. Principles of electricity; loads, distribution, and control; safety; planning systems and selecting appliances.

**98. Directed Group Study** (1-5) I, II, III. The Staff (Studer in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Lower Division Students** (1-5) I, II, III. The Staff (Studer in charge)

(P/NP grading only.)

#### Upper Division Courses

**101. Engines for Automotive, Agricultural, Residential, and Recreational Use** (3) II. Upadhyaya

Lecture—2 hours; laboratory—2 hours. Prerequisite: upper division standing or consent of instructor. Principles of engine construction and operation. Ideal Otto and Diesel cycles. Engine efficiencies and power measurements. Study of valves, fuels, combustion, carburetion and fuel injection, conventional and electronic ignition, starting and charging, cooling, lubricating and emission control systems.

**111. Home Design** (2) III.

Lecture—1 hour; discussion—1 hour; two term projects. Study of factors to be considered in planning, buying, or remodeling homes, including location, orientation, layout, traffic patterns, size, aesthetics, facilities, materials, building codes, regulations, safety, and financing.

**196. Individual Projects** (1-2) I, II, III. Studer

Prerequisite: consent of instructor. Directed exercises in planning and executing independent projects consistent with the student's abilities. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Studer in charge)

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Studer in charge)

(P/NP grading only.)

## Critical Theory

Marc E. Blanchard, Agrégé de Lettres, Program Director (916-752-4787)

Program Office, 516 Sproul Hall, (916-752-5464)

**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 the eight participating departments (Comparative Literature, English, French and Italian, German and Russian, History, Philosophy, Psychology, and Spanish; other departments are in the process of joining). Students complete all requirements for the Ph.D., including the dissertation, in one of the participating departments. The additional requirements leading to the designated emphasis consist of two core courses (200A, 200B) offered by the program in Critical Theory, two additional graduate courses (one of which may be Critical Theory 201), and a special examination.

**Graduate Adviser.** Consult Critical Theory Program Office.

## Courses in Critical Theory

### Graduate Courses

#### 200A. Approaches to Critical Theory (4) I, II. The Staff

Lecture-discussion—4 hours. Prerequisite: graduate standing in a participating program. Investigation into research problems of Critical Theory and a critical examination of various theoretical approaches (e.g., semiotics, hermeneutics, deconstruction, social and cultural critique, feminist theory, psychoanalysis) in an interdisciplinary perspective.

**200B. Problems in Critical Theory (4) II. The Staff** Seminar—3 hours; discussion—1 hour. Prerequisite: course 200A. Practical application of critical theoretical perspectives to a common problem defined in interdisciplinary terms. Topics will vary.

**201. Critical Theory Special Topics (4) III. The Staff** Seminar—3 hours; discussion—1 hour. Prerequisite: course 200A. Application of theoretical principles to one specific research topic.

to reflect the needs and interests of the students, faculty, and society. Self-directed and motivated students contribute to the character of the Design program. They are guided by the faculty to form individualized programs of study around a core of required courses. Students gain not just knowledge of fundamentals of the design professions as they currently exist, but also the outlook necessary to create new approaches to design, and to the development of design as a social tool. The program provides opportunities to acquire a knowledgeable and sound background in design, the skills to use this effectively, and the confidence to apply these skills to innovative design.

At the present time, this curriculum offers study in the areas of costume, textiles, environments, and courses in visual and graphic imagery. The lower division courses prepare the student in basic design practice and theory. Students are encouraged to develop an upper division program which includes courses from textile design, design of the environment, and wearable design and image making, in order to understand the role of design in the formation of our culture. Students may elect to concentrate in one of these areas. Through individual planning, the program offers flexibility to allow for (1) concentration on a speciality, (2) preparation for graduate programs, (3) general education in design stimulating the creativity of the individual, (4) development toward self-education throughout one's entire life span, and (5) techniques to transmit knowledge or skill to one person or many, whenever the need arises.

The faculty is composed of a diverse group of designers and artists working in the fields of play environment and toys, wearable design and ethnic costume, the study of fantasy, printed imagery and book design, energy-efficient architecture, historical and contemporary textiles, textiles in the landscape, interior design, handprinted and dyed textiles, constructed textiles, display and exhibition design, building renovation and conversion, contemporary furniture and small art press printing.

Students will be required to keep a continuing portfolio of their creative work to be evaluated by faculty for the purposes of declaring the major, enrolling in overflow courses, and requesting independent study, internship, or other similar courses.

### B.S. Major Requirements:

	UNITS
<b>Written/Oral Expression</b> .....	<b>7-8</b>
See College requirement .....	7-8
<b>Preparatory Subject Matter</b> .....	<b>32-34</b>
Art (one course from Art 1A, 1B, 1C or 1D) .....	4
Design (Design 1, 2, 3, 11, 12, 13) .....	21
Other (two courses from American Studies 10, Anthropology 2, Geology 2, Psychology 1, Sociology 1, 25, Rhetoric and Communication 1, 3) .....	7-9
<b>Breadth/General Education</b> .....	<b>32</b>
Satisfaction of General Education requirement to include 16 units in natural science and/or Nature and Environment and 16 units in social science and/or Contemporary Societies .....	32
<b>Depth Subject Matter</b> .....	<b>60</b>
Design history, select from Design 140, 142A, 142B, 143, 144 .....	12
Design, selected with adviser's approval ..	12
Design, upper division courses .....	36
<b>Restricted Electives</b> .....	<b>21</b>
(Courses to be selected with approval of adviser.)	
<b>Unrestricted Electives</b> .....	<b>25-28</b>
<b>Total Units for the Degree</b> .....	<b>180</b>

### Additional Requirement

Development of a course of study, in consultation with an adviser, no later than the second quarter of the junior year.

**Major Adviser.** H.B. Olsen (*Environmental Design*).

## Courses in Design

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center for the major, 152 Walker Hall (916-752-1165).

### Lower Division Courses

#### 1. Introduction to Design (4) I. The Staff (Olsen in charge)

Lecture—4 hours. Evolution of 20th-century design emphasizing design elements, materials, principles, and vocabulary.

#### 2. Design Methodology (4) II. The Staff (Olsen in charge)

Lecture—4 hours. Prerequisite: course 1 recommended. Introduction to mental, visual, and sensory processes leading to creation of new forms, images, objects, and environments. Emphasis will be on imagining, producing, evaluating, and communicating ideas in the visual and physical realm.

#### 3. Fantasy Design (4) III. Gotelli

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2. Investigation of fantasy as found in the environment. All aspects of design are explored and fantasy is presented as a problem-solving device.

#### 11. Drawing Studio (4) I. The Staff (Olsen in charge)

Studio—8 hours. Prerequisite: course 1 must be taken concurrently; priority enrollment to Design majors. Drawing for the designer as an aid to perception and communication of ideas, objects, and plans. May be repeated once with a different instructor (course 1 is not repeated).

#### 12. Media Studio (4) II. The Staff (Olsen in charge)

Studio—8 hours; field trip. Prerequisite: course 2 must be taken concurrently; priority enrollment to Design majors. Tools, materials, and techniques used in the designer's studio.

#### 13. Photographic Media Studio (4) III. The Staff (Olsen in charge)

Studio—8 hours. Prerequisite: course 1 or 2; course 3 must be taken concurrently; priority enrollment to Design majors. Film and video tape for description, simulation, analytical research, and design development.

#### 21. Drafting and Perspective (4) I, III. Olsen and the staff

Studio—8 hours. Prerequisite: course in drawing recommended. Creation of three-dimensional designs on two-dimensional surfaces.

#### 22. Basic Imagery (4) I. Butler

Studio—8 hours. Prerequisite: courses 11, 12. Presentation of the fundamentals of designed images, combining a theoretical perspective with practice using the components of visual literacy. Specific focus upon (1) abstract structure, (2) symbolism, and (3) representation.

#### 23. Personal Adornment (4) I. The Staff (Olsen in charge)

Studio—8 hours; field trip. Exploration of the human image altered through ornament and its relation to the human structure.

#### 24. Hand Constructed Textiles (4) I. Laky

Studio—8 hours; one or two field trips. Prerequisite: courses 11, 12. Contemporary approach to textile techniques of construction such as netting, plaiting, knotting and basketry.

#### 25. Reproduction Graphics (4) II. The Staff (Olsen in charge)

Studio—8 hours; field trip. Prerequisite: courses 11 or 12, and 13. Basic studio and photographic skills for the designer; continuous tone, line and halftone films, mechanical and four-color screen separations.

#### 99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Thayer in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

#### 121. Design Delineation (4) II. The Staff (Olsen in charge)

Studio—8 hours; field trip. Prerequisite: courses 11, 12, and 21. Exploration of the process of delineation, including principles of perspective drawing, rapid

## Dance

### See Physical Education

## Dermatology

### See Medicine, School of

## Design

(College of Agricultural and Environmental Sciences)

**Faculty.** See under the Department of Environmental Design.

### The Major Program

Design, as taught and practiced at UC Davis, brings together creativity and ingenuity, and is interdisciplinary in nature. This major attracts students who are interested in studies which will involve them in constructing the future shape of our everyday lives. The program is flexible, changing in content and size

visualization techniques (the quick sketch), rendering, and graphic presentation methods.

**124. Textile Structures (4) III. Laky**

Studio—8 hours; field trip. Prerequisite: course 23 or 24. Art and science of hand building structures in flexible materials. Studying projects in experimental two- and three-dimensional forms with some emphasis on relationships to architecture, furniture and interiors.

**125. Textiles in the Landscape (4) III. Shawcroft**

Lecture—2 hours; studio—5 hours. Prerequisite: courses 21, 22, 24. Structuring organic and mathematical forms in textiles, working with the symbiotic relationship of these textiles and their immediate placement in the outdoor landscape.

**126A. Visual Presentation: Visual Merchandising (4) I, III. Gotelli**

Studio—8 hours; field trips. Prerequisite: course 11, 12 or consent of instructor. Principles and practice of visual communication of ideas through non-verbal presentations. The study of three-dimensional objects in a spatial context with an emphasis on visual merchandising.

**126B. Visual Presentation: Exhibition Design (4) II. Gotelli**

Studio—8 hours; field trips. Prerequisite: course 11, 12 or consent of instructor. Principles and practice of visual communication of ideas through non-verbal presentations. The study of three-dimensional objects in a spatial context with an emphasis on the museum and gallery environment.

**131. Layered Textiles (4) II. The Staff (Olsen in charge)**

Studio—8 hours; one or two field trips. Prerequisite: background in drawing, personal adornment and non-loom textiles recommended. Exploration of multi-pieced and multi-layered textiles: applique, patchwork, quilting, stump work. The individualized influences of materials and techniques on contemporary textiles.

**132A. Loom-Constructed Textile Design (4) I. The Staff (Olsen in charge)**

Studio—8 hours. Prerequisite: course 23 or 24. 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.

**132B. Loom-Constructed Textile Design (4) II. Shawcroft**

Studio—8 hours. Prerequisite: course 132A. Intermediate level study of complex fabric structure with emphasis on pattern in relation to surface, dimension, and material.

**132C. Computer-Aided Textile Design (4) III. Shawcroft**

Studio—8 hours. Prerequisite: course 132B. Micro-computer applications to the structure, design, and weaving of fabrics, emphasizing advanced compositions, drafting, and plotting of multi-dimensional, original weave structures.

**133A-133B. Visual Metaphor (4-4) II, III. Butler**

Studio—8 hours. Prerequisite: courses 13, 22, 25. Study and practice of image generation and production with emphasis on clarity of visual expression, the perception and use of color, and visual composition in the three-dimensional context.

**134A. Fundamentals of Interior Architecture (4) I. The Staff (Olsen in charge)**

Studio—8 hours. Prerequisite: courses 11, 12, 13, and 21 and junior standing. Introduction to design process through simple space planning problems focused on residential and small commercial installations.

**134B. Fundamentals of Interior Architecture (4) II. The Staff (Olsen in charge)**

Studio—8 hours. Prerequisite: course 134A. Problems emphasize energy considerations, structure, building systems, and architectural harmony in the urban environment.

**134C. Fundamentals of Interior Architecture (4) III. Harrison**

Studio—8 hours. Prerequisite: course 134B. Problems emphasize the design of special and technical environments such as laboratories, medical facilities, and computer installations and environments for the handicapped, aged, and very young.

**135. Furniture Design (4) III. Olsen**

Studio—8 hours; one or two field trips. Prerequisite: course 21; course 180A recommended. Development of furniture for interior and exterior spaces. Includes behavioral and physical requirements; cultural and historical expression; structural and aesthetic considerations.

**140. History of Design (4) II. The Staff (Olsen in charge)**

Lecture—4 hours. Prerequisite: Art 1A or the equivalent. Historical survey of the changing relationship of society to its practices and techniques of making and using tools and objects; technological changes, development of design terminology, consumer goods, hand workmanship, and industrial design.

**142A. World Textiles: Far East and Pacific (4) II. Rivers (Olsen in charge)**

Lecture—4 hours, field trip. Prerequisite: courses 132A, 132B, 160A, or 170A (concurrently) highly recommended; course 1, Art 1A, 1B, or 1C also recommended. Textile arts of Japan, China, Africa, India, Oceania, Indonesia, and the Pacific Islands with emphasis on the aesthetic and stylistic qualities of these cultures.

**142B. World Textiles: Middle East, Europe and the Americas (4) III. Laky**

Lecture—4 hours; two field trips. Prerequisite: course 1; a studio class highly recommended; course 24, 124, 131, 132A, 132B, 160A-160B-160C or 170A-170B-170C (concurrently). Study of concepts and methods significant in the historical, social, esthetic and stylistic development of the textile arts.

**143. History of Costume Design (4) II. The Staff (Olsen in charge)**

Lecture—4 hours; field trip. Prerequisite: course 140. History of costume design from the earliest times to the present with emphasis on both aesthetic and functional aspects.

**144. History of Interior Design (4) III. The Staff (Olsen in charge)**

Lecture—4 hours. Prerequisite: course 140 and Art 1C or the equivalent. History of interior design in Europe and America from the classical period to modern times. Emphasis on the dwelling in its cultural setting and the development of the theory of modern interior design.

**160A-160B-160C. Textile Design (4-4-4) I, II, III. The Staff (Olsen in charge)**

Studio—8 hours; one or two field trips. Prerequisite: courses 11 and 12 recommended. Exploration of the design and appreciation of hand printed textiles; emphasis on the unique qualities of the individual as producer.

**170A-170B-170C. Costume Design (4-4-4) I-II-III. The Staff (Olsen in charge)**

Studio—8 hours; field trip. Prerequisite: courses 11 and 23. Studio projects in costume design; consideration of functional and aesthetic factors influencing the historic, contemporary, and projected image of man as expressed through costume.

**180A. Advanced Interior Architecture (4) I. Olsen**

Studio—8 hours; field trip. Prerequisite: course 134C and senior standing. Advanced problems in interior architectural design emphasizing re-use of existing buildings. Focus is on commercial and retail environments, code requirements, color and lighting.

**180B. Advanced Interior Architecture (4) II. Berteaux**

Studio—8 hours; field trip. Prerequisite: course 180A. Advanced problems in interior architectural design emphasizing space planning for corporate and institutional environments.

**180C. Senior Project in Interior Architecture (4) III. Harrison**

Studio—8 hours; field trip. Prerequisite: course 180B. Design of a complex facility, including the integration

of interior design, building structure and building systems.

**190. Proseminar (1) II. Harrison**

Seminar—1 hours. 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. (P/NP grading only.)

**191A-D. Workshops in Design (4-12) I, II, III. The Staff (Olsen in charge)**

Seminar—1 hour; studio or field experience—3 hours per unit (units determined by instructor and student); field trip. Prerequisite: course 11, 12; upper division standing and consent of instructor. Faculty initiated workshops featuring advanced studies and applications of original work in Design: (A) Costume; (B) Environment; (C) Graphics; (D) Textiles. Credit limited to 12 units in one section or a combination of sections. Letter grading by contract.

**192. Internship (1-6) I, II, III summer. The Staff (Olsen in charge)**

Field placement—3-18 hours. Prerequisite: completion of 84 units and consent of instructor. Supervised internship, off and on campus, in areas of design including environmental, costume, textile, museum, display and interior design. Enrollment limited to 3 units per quarter or 6 units per summer session. (P/NP grading only.)

**197T. Tutoring in Design (1-5) I, II, III. The Staff (Olsen in charge)**

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) I, II, III. The Staff (Olsen in charge)**

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

**199. Special Study of Advanced Undergraduates (1-5) I, II, III. The Staff (Olsen in charge)**

(P/NP grading only.)

## Development, Resource, and Consumer Economics

### See Agricultural and Managerial Economics

## Dietetics

(College of Agricultural and Environmental Sciences)

### The Major Program

The Dietetics major provides the student with training in normal and therapeutic nutrition, biological and social sciences, food science, communication, and 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. Dietitians are sought for administrative, therapeutic, teaching, research, and public service positions in hospitals, schools, clinics, and other institutions. Students will be qualified for admission to graduate programs in dietetics, nutrition science, public health nutrition and food service management.

**B.S. Major Requirements:**

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses. Equal or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

	UNITS
<b>Written/Oral Expression</b> .....	<b>8</b>
Written expression (English 1 or 3) .....	4
Oral expression (Rhetoric and Communication 1) .....	4
(Above courses simultaneously satisfy College requirement)	
<b>Preparatory Subject Matter</b> .....	<b>52-53</b>
Biological sciences (Biological Sciences 1A, 1B) .....	10
Chemistry (Chemistry 1A, 1B, 8A, 8B) .....	16
Computer science (Agricultural Science and Management 21 or Computer Science Engineering 10) .....	3
Economic principles (Economics 1A or 1B) .....	5
Microbiology (Microbiology 102, 102L) .....	6
Psychology (Psychology 1) .....	4
Social science theory (Sociology 1 or 3 or Anthropology 2) .....	4-5
Statistics (Statistics 13) .....	4
<b>Breadth/General Education</b> .....	<b>6-24</b>
Satisfaction of General Education requirement .....	6-24
<b>Depth Subject Matter</b> .....	<b>71-72</b>
Agricultural Economics 112 .....	4
Applied Behavioral Sciences 173 or Education 110 or 111 .....	4
Biological chemistry (Biochemistry 101A-101B or Physiological Sciences 101A-101B) .....	6-7
Food Science and Technology 100A, 100B, 101A, 101B .....	10
Food Service Management 120, 120L, 121, 122, 123 .....	14
Nutrition 110, 111, 113, 116A, 116AL, 116B, 116BL, 118, 190 .....	26
Physiology (Physiology 110, 110L) .....	7
<b>Unrestricted Electives</b> .....	<b>23-43</b>
<b>Total Units for the Major</b> .....	<b>180</b>

**Major Adviser.** F.J. Zeman (*Nutrition*).

**Advising Center** for the major is located in 1151 Meyer Hall (916-752-2512).

**Graduate Study.** See the Graduate Division section in this catalog.

with its University Theatre Season and its Premiere and Studio Seasons, has the following objectives: to form intelligent theatre-goers as part of a liberal arts education (in both lower division and upper division work); to provide a foundation for potential specialists (primarily in upper division work); and to train specialists for careers in theatre, film, video, education, or related fields (graduate work).

**The University Theatre.** Each year the Department of Dramatic Art presents a series of stage productions of outstanding dramas from various periods and countries. These productions are part of the academic program of the Department and serve an important purpose in the study of dramatic art. Participation is open to all students.

**Granada Artists-in-Residence Program.** Each quarter a major British director joins the department to direct and teach directing.

**A.B. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>22</b>
Dramatic Art 20, 21A, 24, 25 .....	14
Dramatic Art 21B or 27 .....	3-4

Additional units to achieve a total of 22 lower division units in Dramatic Art.....4-5

	40
Dramatic Art 124A, 124B, 127A, 127B or 160B, 156, 157, 158, 159, 160A .....	36

A minimum of 4 elective units chosen from the following: Dramatic Art 115, 121A, 121B, 124C, 124D, 126, 150, 153, 155; or, with the adviser's consent, from appropriate literature courses in language and literature departments.....4

**Additional Requirements**

During the undergraduate career majors are to participate in at least eight dramatic productions (exclusive of classroom projects). Participation must include work in acting, scene construction, costume construction, lighting, and stage managing or directing. Majors are also expected to attend theatre performances.

	52
<b>Total Units for the Major</b> .....	<b>52</b>

**Minor Program Requirements:**

	UNITS
<b>Dramatic Art</b> .....	<b>20</b>
Dramatic Art 124A, 160A, 156, 157 or 158, 159 .....	20

**Major Advisers.** E. Carlin, R. Fetterly.

**Transfer Students.** If you are a transfer student you should see the major adviser for an evaluation of your experience.

**Teaching Credential Subject Representative.** R. Fetterly. See also the Teacher Education Program.

**Graduate Study.** The Department of Dramatic Art offers programs of study and research leading to the M.A., M.F.A. (acting, design, directing, or play writing), and Ph.D. (theatre research) degrees. Detailed information may be obtained by contacting the Graduate Adviser.

**Graduate Adviser.** W.E. Kleb.

**Courses in Dramatic Art****Lower Division Courses**

**10. Introduction to Acting** (3) I, II, III. The Staff Lecture-discussion—4 hours; term paper. Fundamentals of movement, speech, theatre games, and improvisation. Selected reading and viewing of theatre productions. Intended for students not specializing in Dramatic Art.

**15. The Art of the Cinema** (4) II. The Staff Lecture—2 hours; discussion—1 hour; film viewing—2 hours. The cinema as an art form; its relation to other arts; its evolution with emphasis on the significant modern contributions.

**\*15L. Introduction to Filmmaking** (2) I. d'Harnoncourt

Lecture-discussion—3 hours; film viewing—2 hours. Prerequisite: course 15 concurrently or consent of instructor. Students in small groups will write, shoot, and edit 8 mm films, and prepare sound tracks for them.

**20. Introduction to Dramatic Art** (4) I, III. Kleb

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.

**21A. Fundamentals of Acting** (4) II. The Staff

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 20. 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. Limited to those planning to major in Dramatic Art.

**21B. Fundamentals of Acting** (4) III. The Staff

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 21A and consent of instructor. Theory and practice of acting with emphasis on character analysis, interpretation, and development. Acting in a student-directed project. Viewing of theatre productions. Limited to those planning to major in Dramatic Art.

**24. Visual Aspects of Dramatic Art** (4) III. Snyder

Lecture—3 hours; laboratory—2 hours. Understanding and appreciation of the visual aspects of dramatic art; theatre architecture, scenery, lighting, costume, and makeup.

**25. Technical Aspects of Dramatic Art** (2) III. Fetterly

Lecture—1 hour; laboratory—2 hours. Understanding and appreciation of the technical principles of dramatic production; basic tools and materials, principles of scene construction; scene painting, costume construction, stage rigging, lighting and sound equipment and control systems.

**27. Fundamentals of Playwriting and Directing** (3) I. Kleb

Discussion—2 hours; workshop—2 hours; reading of selected texts in the theory of directing and playwriting. Prerequisite: consent of instructor. Exercises in conceiving and developing theatre pieces with emphasis upon the creative collaboration of playwright and director.

**28. Visual Arts and Theatre** (4) I. Snyder

Lecture-discussion—4 hours. The correlation between the visual arts and design for performance. Intended for students in the visual arts as well as for prospective majors.

**30. Theatre Laboratory** (1-5) I, II, III. The Staff

Prerequisite: course 25 or 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 a total of 8 units.

**\*70. Theatre in Performance** (4) III. Kleb

Lecture-seminar—4 hours. Theatre attendance and appreciation; traditional and experimental. Field trips, readings, discussions. Intended for students not specializing in Dramatic Art as well as for prospective majors. May be repeated once for credit.

**98. Directed Group Study** (1-5) I, II, III. The Staff

(Chairperson in charge) Primarily for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

**Upper Division Courses**

**\*115. Advanced Study of Major Film Makers** (4) II. d'Harnoncourt

Lecture-discussion—3 hours; film viewing—2 hours. Prerequisite: course 15. Analysis of the contribution of some outstanding film creators. Study of diverse

**Dramatic Art**

(College of Letters and Science)

Robert A. Fahrner, Ph.D., Chairperson of the Department

Department Office, 222 Dramatic Art Building (916-752-0888)

**Faculty**

Elizabeth Carlin, M.F.A., Assistant Professor  
Ruby Cohn, Ph.D., Professor (*Dramatic Art, Comparative Literature*)

Robert A. Fahrner, Ph.D., Professor

Ralph Fetterly, M.A., Associate Professor

Harry C. Johnson, M.A., Professor

William E. Kleb, D.F.A., Associate Professor

Phyllis J. Kress, M.F.A., Adjunct Lecturer

Robert K. Sarlos, Ph.D., Professor

Daniel E. Snyder, Professor

Alan A. Stambusky, Ph.D., Professor

Darrell F. Winn, M.A., Adjunct Lecturer

**The Major Program**

Dramatic Art, with its classroom courses in each of the scholarly and artistic areas of the discipline, and

aesthetic theories of the cinema and their application to selected films. May be repeated for credit when different film creator studied.

**121A. Advanced Acting (4) I. Johnson**

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 21B and consent of instructor. Theory and practice of acting focusing on performance problems and the maximization of individual resources.

**121B. Advanced Acting (4) II. The Staff**

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 121A and consent of instructor. Theory and practice of acting focusing on performance problems and the maximization of individual resources.

**124A. Principles of Theatrical Design: Scenery (4) I. Fetterly**

Lecture-seminar—4 hours. Prerequisite: course 24 or consent of instructor. Scene design processes, working drawings, sketching techniques, scale models, methods and materials of scenery construction.

**124B. Principles of Theatrical Design: Scenery (4) II. Snyder**

Lecture-seminar—4 hours. Prerequisite: course 24 or consent of instructor. Analysis of plays in terms of scene design, elements of design, execution of designs for modern and period plays.

**124C. Principles of Theatrical Design: Lighting (4) III. Winn**

Lecture-seminar—4 hours. Prerequisite: course 24 or consent of instructor. Theories of lighting the stage, equipment and control systems, execution of lighting plots.

**124D. Principles of Theatrical Design: Costume (4) II. Kress**

Lecture-seminar—4 hours. Prerequisite: course 24 or consent of instructor. 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.

**126. Production Management (3) II. Winn**

Lecture—3 hours. Prerequisite: course 25. Theoretical study of backstage operation from audition through performance: techniques of stage management, technical direction, cueing procedures and audience control. Offered in even-numbered years.

**127A. Principles of Directing (4) I. Stambusky**

Lecture—2 hours; laboratory—4 hours; rehearsal. Prerequisite: courses 21A, 21B, or 27; 156, 157, 158, or consent of instructor. The director's creative approach to the play and to its staging.

**127B. Principles of Directing (4) II. Stambusky**

Lecture—2 hours; laboratory—4 hours; rehearsal. Prerequisite: course 127A and consent of instructor for non-majors. The director's creative approach to the actor.

**\*150. American Theatre and Drama (4) II. Sariós**

Lecture—4 hours. The history of the theatre from Colonial times to the present. Readings of selected plays. Offered in odd-numbered years.

**\*153. The American Musical (4) III. Kleb**

Lecture—4 hours. History and development of the American Musical as a unique theatrical form. Offered in odd-numbered years.

**155. Black Theatre and Drama (4) III. Johnson**

Lecture—4 hours. Black Theatre and drama today: the history, impact and current direction of the work of Blacks in the theatre. Offered in even-numbered years.

**156. Theatre and Drama: Aeschylus to Machiavelli (4) I. Sariós**

Lecture—4 hours. Selected plays and the history of the theatre from ancient Greece through the Italian and Spanish Renaissance. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4A or 4B.

**157. Theatre and Drama: Shakespeare to Schiller (4) II. Sariós**

Lecture—4 hours. Selected plays and the history of the theatre from the English Renaissance through German and French Romanticism. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4A or 4B.

**158. Theatre and Drama: Ibsen to Albee (4) III. Fahrner**

Lecture—4 hours. Selected plays and the history of the theater from English Romanticism to the present.

**159. Contemporary Experimental Theatre and Drama (4) III. Kleb**

Lecture—4 hours. Examination and evaluation of the "New Theatre." Course includes attending theatre events.

**160A-160B. Principles of Playwriting (4-4) I-II. Kleb and staff**

Lecture-seminar—4 hours. Prerequisite: two courses in Dramatic Art or related courses in other departments. Analysis of dramatic structure; preparation of scenarios; the composition of plays.

**180. Theatre Laboratory (1-5) I, II, III. The Staff**

Prerequisite: upper division standing and course 25, or consent of instructor. Projects in acting, production, scene design, costuming lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit.

**192. Internship in Dramatic Art (1-12) I, II, III. The Staff (Chairperson in charge)**

Field work—3-36 hours. Prerequisite: upper division or graduate work in dramatic art; upper division course related to the project; consent of instructor and Department Chairperson. Internship outside the academic department enabling students to practice their skills. May be repeated for credit for a total of 12 units. (P/NP grading only.)

**197T. Tutoring In Dramatic Art (1-4) I, II, III. The Staff (Chairperson in charge)**

Tutoring—1—4 hours. Prerequisite: upper division or graduate standing with major in dramatic art; 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.)

**198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**200. Methods and Materials in Theatre Research (4) I. Sariós**

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 (2) I, II, III. Carlin**

Laboratory—4 hours. Open to advanced undergraduates with consent of instructor. Voice production and speech related to specific acting problems in classical plays, particularly in verse. May be repeated for credit.

**212. Advanced Stage Movement (2) I, II, III. The Staff**

Laboratory—4 hours. Prerequisite: open to advanced undergraduates with consent of instructor. Rhythmic movement patterns relating to acting problems in classic and modern plays. May be repeated for credit.

**221. Special Problems in Advanced Acting (4) I, II, III. Johnson, Carlin**

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. Visual Problems in Theatre and Performance (4) I. Snyder**

Seminar—3 hours; term project. Special problems in visual and auditory aspects of theatrical production culminating in a single performance project. Open to Dramatic Art, Art, and Design majors. May be repeated for credit.

**224B. Advanced Principles and Theories of Theatrical Design (4) II. Fetterly**

Seminar—3 hours; term paper. Selected problems in the design of stage scenery and costumes; practice in design. May be repeated for credit.

**224C. Advanced Principles and Theories of Theatrical Design (4) III. Snyder**

Seminar—3 hours; term paper. Design of a production for three different types of theatres: open stage, arena, and proscenium. May be repeated for credit.

**224D. Advanced Principles and Theories of Theatrical Costume Design (4) II. Kress**

Seminar—3 hours; research and design projects—30 hours (minimum) total. Prerequisite: course 124D or consent of instructor. Costume design projects emphasizing research, principles, and theories; the planning and presentation of costume renderings, detail accessory sketches, and scale drawings of patterns. Projects from classic theatre, musical comedy, ballet, and opera. Offered in even-numbered years.

**\*224E. Advanced Principles and Theories of Theatrical Lighting Design (4) II. Winn**

Seminar—3 hours; laboratory—2 hours. Prerequisite: course 124C, a scenic design course, and consent of instructor. Design concepts, script/score analysis, color, composition and style. Projects presented in studio atmosphere. Also included: renderings, written analyses, and drafted plots. Offered in odd-numbered years.

**\*227. Seminar in Directing Theory: Realism (4) I. Granada**

Seminar—3 hours; term project. Modern directing theory as it applies to theatrical realism; development of directorial concepts for productions of selected realistic plays; emphasis on textual analysis. Offered in even-numbered years.

**\*228. Seminar in Directing Theory: Non-Realism (4) I. Granada**

Seminar—3 hours; term paper. Modern directing theory as it applied to non-realistic theatre; development of directorial concepts for production of selected non-realistic plays—Greek to the present; emphasis on textual analysis. Offered in odd-numbered years.

**229. Special Problems in Directing (5) I, II, III. Granada**

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 for credit.

**\*230A-230B. Classic and Medieval Theatre (4-4) II-III. Kleb, Sariós**

Seminar—3 hours; term paper. The theatre of Greece, Rome and Middle Ages; emphasis on relationship of dramas of the period to physical circumstances of production. Course 230A (may be taken separately) includes readings and discussion; 230B emphasizes research culminating in a substantial scholarly paper.

**\*235A-235B. Renaissance and Baroque Theatre (4-4) II-III. Fahrner, Sariós**

Seminar—3 hours; term paper. The theatre of Italy, Spain, England, and France, 1500-1660; emphasis on relationship of dramas of the period to physical circumstances of production. Course 235A (may be taken separately) includes readings and discussion; 235B emphasizes research culminating in a scholarly paper.

**240A-240B. Neoclassic and Romantic Theatre (4-4) II-III. Fahrner, Sariós**

Seminar—3 hours; term paper. The theatre of France, England, Germany, Italy, and America, 1660-1860; emphasis on relationship of dramas of the period to physical circumstances of production. Course 240A (may be taken separately) includes readings and discussion; 240B emphasizes research culminating in a scholarly paper.

**\*250. Modern Theatre (4) II. Sariós**

Seminar—3 hours; term paper. The theatre of Europe and America, 1860-1940, with emphasis on the relationship of the dramas of the period to the physical

## 190 Earth Sciences and Resources (A Graduate Group)

circumstances under which they were produced. Offered in even-numbered years.

### 259. Contemporary Theatre (4) I. Cohn

Seminar—3 hours; term paper. Selected aspects of contemporary Western theatre, with attention to their modes of production.

### 260. Advanced Playwriting (4) I, II, III. Kleb and staff

Seminar—3 hours; term paper. Dramatic structure, character, and dialogue. Advanced projects in playwriting. May be repeated for credit.

### 265. Theory of Dramatic Art (4) I. Kleb

Seminar—3 hours; term paper. Theory and aesthetic principles of dramatic art as a fine art. Offered in odd-numbered years.

### 280. Theatre Laboratory (1-12) I, II, III. The Staff

Advanced practice in acting, designing, directing, playwriting, and technical theatre. May be repeated for credit.

### 298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor.

### 299. Individual Study (1-12) I, II, III, The Staff (Chairperson in charge)

(S/U grading only.)

### 299D. Dissertation Research (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

### Professional Course

#### 413. Stage Make-up (1) II. The Staff

Lecture-laboratory—2 hours. Prerequisite: consent of instructor. Lectures, demonstrations, and practical work in aspects of theatrical make-up.

## Courses in Earth Sciences and Resources

### Graduate Courses

#### 200. Survey of Earth Sciences and Resources (2)

I. Grismer

Lecture—1 hour; discussion—1 hour; paper. Prerequisite: open to students in the Earth Sciences and Resources program. Introductory course exposes students to the diversity of sciences involved in the program. Students prepare a paper and presentation in their area of interest. May be repeated once for credit. (S/U grading only.)

#### 201. Earth Science and Resources (3) II. Moores (Geology)

Seminar—3 hours. Prerequisite: Physics 9B, Mathematics 22C, Chemistry 4C or consent of instructor. Advanced survey of the earth's structure and processes. Internal structure and plate tectonics. Principles of mineralogy and petrology. Igneous, and metamorphic processes. Sedimentation and stratigraphy. Deformation and regional structure. Energy, ore and water resources. Graduate students in Geology may enroll only with consent of instructor.

#### 297. Seminar in Earth Sciences (3) III. The Staff

Seminar—3 hours. Prerequisite: graduate standing; consent of instructor. Seminar on current area of research in earth sciences and resources. Topic will change from year to year. May be repeated for credit.

#### 298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

#### 299. Research (1-12) I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

## A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b>	<b>38-39</b>
History 9A, 9B.....	8
One course from Art 1D, 20, Chinese 10, 11, Comparative Literature 53A, History 90A, Japanese 10, 25, Religious Studies 70, 75.....	3-4
Two years (or the equivalent) of Chinese or Japanese language study (Chinese 1-2-3-4-5-6; Japanese 1-2-3-4-5-6).....	27

#### Depth Subject Matter ..... 36

Must include at least 8 units of core courses from each of the following categories: history, social science, and humanities. Core courses in each category are listed below.

##### History:

History 190B-190C, 194B-194C

##### Social Science:

Anthropology 148A, 148B, 149A, 149B

Economics 171

Geography 127

Political Science 148A, 148B

Sociology 147

##### Humanities

Art 163A, 163B, 163C, 164

Chinese 104, 106, 107

Japanese 101, 102, 103

Religious Studies 172

At least 12 additional units must be selected from the above courses, or from the following: Anthropology 110, 111, 112, 120, 122, 123, 124, 128; Chinese (any upper division course); Economics 115A, 115B, 116, 160A, 160B, 162; Geography 143; History 102G, 102H, 102N, 190A, 191A, 191B, 193, 194A, 194D, 195; Japanese (any upper division course); Linguistics 100; Political Science 127, 133, 138, 145, 148C; Sociology 118, 141, 170, 183. (Or other appropriate courses, including individual and group study courses (198, 199), as approved by the Committee in charge.)

#### Total Units for the Major ..... 74-75

### Recommended

Students are strongly urged to take a substantial number of courses in Euro-American civilization as a basis for comparison for a deeper understanding of America's relations with East Asia.

## Minor Program Requirements:

Courses taken for the minor are expected to reflect a predominant interest in either China or Japan, but also to provide some exposure to the other of the two countries. All courses counting towards the East Asian Studies major, including individual and group study courses (198, 199), may be used to fulfill the requirements for the minor program, as long as they deal predominantly with China, Japan, or both.

### UNITS

#### East Asian Studies ..... 22

History 9B and 18 upper division units, of which at least 12 must be in courses focusing on China; OR History 9A and 18 upper division units, of which at least 12 must be in courses focusing on Japan ..... 22

#### Major Advisers. Consult Program Director.

**Courses in East Asian Studies.** The following courses count toward the major and are open to students throughout the campus. Refer to departmental listings for course descriptions.

#### Anthropology

148A. Traditional Chinese Society

148B. Communist Chinese Society

149. Culture of Japan

#### Art

1D. Asian Art

20. Myths and Symbols in Chinese Art

163A. Chinese Art

163B. Chinese Painting

163C. Painting in the People's Republic of China  
164. The Arts of Japan

#### Chinese

All courses.

#### Comparative Literature

53A. Literature of China and Japan  
153. Forms of Asian Literature

#### Economics

171. Economy of East Asia

#### Geography

127. Contemporary East Asia

#### History

9A. History of East Asian Civilization (China)  
9B. History of East Asian Civilization (Japan)  
90A. Modernization of China  
102G. Undergraduate Proseminar: China to 1800  
102H. Undergraduate Proseminar: China since 1800  
102N. Undergraduate Proseminar: Japan  
190A, 190B. Late Imperial China: Background to Revolution

190C. The Chinese Revolution

191A. Classical China

191B. High Imperial China

193. History of the People's Republic of China, 1949 to the Present

194A. Aristocratic and Feudal Japan

194B. Early Modern Japan

194C. Modern Japan

194D. Business and Labor in Modern Japan

194E. Education and Technology in Modern Japan

195. Modern China and the West

#### Japanese

All courses.

#### Linguistics

100. Languages of Eastern Asia

#### Political Science

133. The American Role in East Asia

138. International Relations: East Asia

148A. Government and Politics in East Asia: China

148B. Government and Politics in East Asia: Pacific Rim

148C. Government and Politics in East Asia: Southeast Asia

#### Religious Studies

70. Introduction to Buddhism

75. Chinese Philosophy: An Introduction

172. Ch'an (Zen) Buddhism

#### Sociology

147. Sociological Perspectives on East Asia

## Courses in East Asian Studies

### Upper Division Courses

#### 113. Cinema and Society in China (4) III. Gibbs

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.

#### 192. East Asian Studies Internship (1-12) I, II, III.

The Staff

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) I, II, III.

The Staff (Chairperson in charge)

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.)

#### 198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

## Ecology (A Graduate Group)

Theodore C. Foin, Ph.D., Chairperson of the Group  
Group Office, 3122 Wickson Hall (916-752-6752)

**Faculty.** The Group includes faculty from 45 departments in five schools and colleges.

**Graduate Study.** The Graduate Group in Ecology offers the M.S. and Ph.D. degrees in the areas of biological, human, and physical and chemical ecology. Several areas of specialization are possible in each of these three areas. Details of the program may be obtained from the Chairperson of the Group or the Group office.

**Preparation.** Appropriate preparation is undergraduate work in any of the biological, social or behavioral, and physical sciences, mathematics or engineering. Applicants to the biological and physical-chemical options will normally be expected to have completed two courses each in introductory biology, general chemistry, physics, mathematics, statistics, and evolution. Applicants to the human ecology option may substitute quantitative social science courses for up to two courses of chemistry or physics. Each of the three broad areas requires certain advanced preparation appropriate to the option. Details may be found in the Group Announcement.

**Course Requirements.** The Ecology program is one of the most diverse on the Davis campus. In order to accommodate varied student interests, the Group depends on close consultation between students and faculty for program development. A list of recommended courses for various options is available from the Group office.

**Graduate Adviser.** T.C. Foin.

## Courses in Ecology

### Graduate Courses

#### 200A. Principles and Application of Ecological Theory (4) I. Elliott-Fisk

Lecture—3 hours; discussion—1 hour. Prerequisite: first course in ecology; Statistics 102; Mathematics 16A, 16B. Critical evaluation of ecological theory and applications to ecological management. Historical development of ecological theory is emphasized. Critical evaluation of ecological principles pertaining to the structure and dynamic properties of ecological systems, their organization and evolution.

#### 200B. Principles and Application of Ecological Theory (4) II. Elliott-Fisk

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200A. Continuation of course 200A. Critical evaluation of theory and application in the areas of ecological adaptation and system plasticity, spatial and temporal scales, ecological energetics, and system dynamics. Synthesis of ecological theory into testable principles.

#### 203. Physiological Ecology of Animals (3) III. Patterson (Environmental Studies)

Lecture—2 hours; discussion—1 hour. Prerequisite: Zoology 125 or Physiology 110 or the equivalent; elementary calculus. Comparative examination of several animal groups addressing fundamental physiological mechanisms that shape the ecology of the animal group.

#### 204. Population and Community Ecology (4) I.

Toft, Schoener, Salt (Zoology)

Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies 100 or Zoology 125, Mathematics 21A-21B, or consent of instructor; Mathematics 22B strongly recommended. Review of major theoretical concepts of population and community ecology, with emphasis on both the rationale of the theory and its correspondence to natural phenomena.

#### 205. Structure of Ecological Communities (4) II.

Quinn (Environmental Studies)

Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies 100 or Zoology 125 or Botany 117, Genetics 103 or Botany 100 or Zoology 148, and Mathematics 21A-21B; Ecology 204 and Mathematics 22A-22B strongly recommended. Provides entry-level graduate students and advanced undergraduates an introduction to literature and contemporary research into processes structuring ecological communities. Particular emphasis placed on ecological phenomena with a significant spatial component, e.g., gene flow, colonization, and extinction.

#### 206. Concepts and Methods in Plant Community Ecology (4) I. Rejmánek (Botany), Barbour (Botany), Menke (Agronomy)

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.

#### 207. Plant Population Biology (3) II. Rice (Agronomy), Jain (Agronomy)

Lecture—2 hours; laboratory-discussion—1 hour. Prerequisite: advanced undergraduate ecology course (e.g., Environmental Studies 100, Zoology 125, Botany 117, or Entomology 104) and advanced undergraduate course in genetics and/or evolution (e.g., Genetics 100, 103, or Botany 100). Provides entry-level graduate students and advanced undergraduates with an introduction to both theoretical and empirical research in plant population biology. Emphasis will be placed on linking ecological and genetic approaches to plant population biology. Offered in odd-numbered years. (Same course as Agronomy 207.)

#### 210. Advanced Topics in Human Ecology (4) III.

Orlove (Environmental Studies)

Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing. Course stresses the commonalities that human ecologists have as social scientists who specialize in problems relating human populations and environmental variables. General epistemological issues and theoretical models are reviewed. Similarities and differences of human and biological ecology are examined. Offered in odd-numbered years.

#### 211. Advanced Topics in Cultural Ecology (3) I.

Orlove (Environmental Studies)

Lecture—3 hours. Prerequisite: graduate standing. Discussion and evaluation of theories which relate environment, culture and social structure. The works of several major theorists will be examined with regard to analytical models, empirical data, research methodologies, and modes of explanation. Offered in even-numbered years. (Same course as Anthropology 211.)

#### 212A. Environmental Policy Analysis (4) III.

Lecture—3 hours; discussion—1 hour; seminar paper. Prerequisite: course in public policy (e.g. Political Science 107 or 108); course in bureaucratic policy making (e.g., Environmental Studies 166 or Political Science 181); course in intermediate statistics (e.g., Sociology 106 or Agricultural Economics 106). An examination of selected topics in the formulation and implementation of environmental policy, with a principal emphasis on conceptual and methodological issues. Offered in odd-numbered years. (Same course as Environmental Studies 212A.)

#### 212B. Environmental Policy Analysis: Evaluation (4) I. Schwartz (Environmental Studies)

Lecture—1 hour; discussion—1 hour; seminar—2 hours; independent evaluation project. Prerequisite: Economics 100 or the equivalent; Environmental Studies 168A (or the equivalent course in policy analysis or resource economics); intermediate level statistics (e.g., Sociology 106 or Agricultural Economics 106). Examination of recent research and

practice in the evaluation of environmentally related policies, programs and plans. Ex-ante and ex-post evaluation will be studied. Offered in odd-numbered years. (Same course as Environmental Studies 212B.)

**213. Population, Environment, and Social Structure** (4) II. The Staff

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 even-numbered years.

**\*221. Chemical Aspects of Ecology** (3) I.

Lecture—3 hours. Prerequisite: Chemistry 1A-1B-1C and 8B or 128C (or the equivalent); a course in biological ecology; graduate standing and consent of instructor. A week will be spent on each of nine subjects including chemical ecology of reproduction, nutrition, defense, communication, adaptation, and ecosystem structure and function. Offered in odd-numbered years.

**\*230. Analysis of a Selected Ecosystem** (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing. Application of basic ecological principles to the interpretation of biotic and abiotic interrelationships of a particular ecosystem. Recent advances in theory, technique, and basic information are emphasized.

**232. Theoretical Ecology** (3) III. Hastings (Environmental Studies)

Lecture—3 hours. Prerequisite: courses 204, 205 and Mathematics 22A-22B; or Environmental Studies 100, Environmental Studies 128 or Zoology 125, and Mathematics 118B and 119. 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 even-numbered years.

**290. Seminar in Ecology** (1-3) I, II, III. The Staff (Chairperson in charge)

Seminar—1 to 3 hours. Prerequisite: consent of instructor. Topics in biological, human, physical, and chemical ecology. Students are expected to present an oral seminar on a particular aspect of the general topic under consideration. (S/U grading only.)

**291. Biological Conservation** (3) II. Schonewald-Cox (Environmental Studies)

Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Examines characteristics of populations that make them vulnerable to extinction and examines various methods that can be used in the restoration process. Although both plants and animals are of interest, emphasis will be on vertebrates. Offered in odd-numbered years.

**296. Topics in Ecology** (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Prerequisite: graduate standing in Ecology. (S/U grading only.)

**297. Tutoring in Ecology** (1-4) I, II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

**299. Research** (1-12) I, II, III. (Chairperson in charge)

Prerequisite: graduate standing. (S/U grading only.)

## Economics

(College of Letters and Science)

Steven M. Sheffrin, Ph.D., Chairperson of the Department

Department Office, 381 Kerr Hall (916-752-0741)

**Faculty**

Giacomo Bonanno, Ph.D., Assistant Professor  
Severin Borenstein, Ph.D., Associate Professor  
Andrzej Brzeski, Ph.D., Professor  
<sup>4</sup>Robert C. Feenstra, Ph.D., Associate Professor  
Bruce Glassburner, Ph.D., Professor Emeritus  
W. Eric Gustafson, Ph.D., Senior Lecturer  
L. Jay Helms, Ph.D., Associate Professor  
<sup>2</sup>Kevin D. Hoover, D.Phil., Assistant Professor  
Hiromitsu Kaneda, Ph.D., Professor  
Tracy R. Lewis, Ph.D., Professor  
Peter H. Lindert, Ph.D., Professor  
Louis Makowski, Ph.D., Associate Professor  
Thomas Mayer, Ph.D., Professor  
Julie A. Nelson, Ph.D., Assistant Professor  
Alan L. Olmstead, Ph.D., Professor  
John E. Roemer, Ph.D., Professor  
Kevin D. Salyer, Ph.D., Assistant Professor  
<sup>1</sup>Steven M. Sheffrin, Ph.D., Professor  
<sup>1</sup>T. Y. Shen, Ph.D., Professor  
<sup>4</sup>Joaquim Silvestre, Ph.D., Professor  
Arthur M. Sullivan, Ph.D., Associate Professor  
(*Economics, Management*)  
Robert K. Triest, Ph.D., Assistant Professor  
Elias H. Tuma, Ph.D., Professor  
Gary M. Walton, Ph.D., Professor (*Economics, Management*)  
Leon L. Wegge, Ph.D., Professor  
Wing T. Woo, Ph.D., Assistant Professor

### The Major Program

Economics is the study of human social arrangements and institutions used in mankind's efforts to satisfy material wants. The economic problem is to maximize satisfaction of society's material wants within the limits established by the availability of resources and the state of our knowledge, with due allowance for noneconomic values. To maximize the economy's economic welfare, a society must utilize scarce resources fully and efficiently in the production of goods of highest social priority and then distribute that output equitably among its members.

A major in economics will assist the student to learn how economists examine these questions, and is an appropriate major for undergraduates contemplating graduate study in business administration, law, regional planning or public affairs.

### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>22-26</b>
Economics 1A-1B .....	10
Statistics 13, 32, or 102 .....	3-4
Mathematics 16A-16B-16C or 21A-21B-21C .....	9-12
<b>Depth Subject Matter</b> .....	<b>40</b>
Economics 100 or 100M; 101 .....	10
One course from Economics 110A, 110B, 111A, 111B .....	4
One course sequence from Economics 110A-110B; 111A-111B; 115A-115B; 116-117; 121A-121B; 125-130; 125-131; 130-131; 136A-136B; 151A-151B; 160A-160B .....	8
Additional economics courses to achieve a minimum of 40 upper division units ..	18
<b>Total Units for the Major</b> .....	<b>62-66</b>

### Recommended

Students considering graduate study in economics or business administration are strongly urged to take Mathematics 21A-21B-21C and 22A.

The Economics Department suggests that Eco-

nomics 100 and 101 be taken as soon as possible after the introductory courses.

Except under extraordinary circumstances, not more than three economics courses may 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 3.5 grade-point average in those courses, and complete at least six 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.

**Major Advisers.** A. Brzeski, C. Cameron, R.C. Feenstra, W.E. Gustafson, K.D. Hoover, H. Kaneda, T.R. Lewis, L. Makowski, J. Nelson, R.K. Triest, E.H. Tuma.

**American History and Institutions.** This University requirement can be satisfied by completion of Economics 111A, 111B. (See also under University requirements.)

**Teaching Credential Subject Representative.** A. Brzeski. See also the Teacher Education Program.

**Graduate Study.** Students who meet the admission requirements of the Graduate Division 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 contact the chairperson of the departmental graduate committee.

**Graduate Advisers.** L.J. Helms, P. Lindert, T. Mayer, A.L. Olmstead, J.E. Roemer, J. Silvestre, L.L. Wegge.

## Courses in Economics

### Lower Division Courses

**1A. Principles of Microeconomics** (5) I. Gustafson and staff; II. Walton; III. Gustafson and staff  
Lecture—3 hours; discussion—2 hours. Courses 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. General Education credit for non-GE course sequence (1A-1B) which will satisfy one GE course: Contemporary Societies/Introductory. (CAN Econ 4)

**1B. Principles of Macroeconomics** (5) I. Kaneda; II. The Staff; III. Tuma  
Lecture—3 hours; discussion—2 hours. Courses 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. General Education credit for non-GE course sequence (1A-1B) which will satisfy one GE course: Contemporary Societies/Introductory. (CAN Econ 2)

**11A. Elementary Accounting** (4) I, II. The Staff  
Lecture—3 hours; laboratory—2 hours. History and basic concepts of accounting; the ledger, journals, income statement, and the balance sheet; inventory valuation; depreciation; introduction to cost accounting; analysis of financial statements. (CAN Bus 2)

**11B. Elementary Accounting** (4) II, III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 11A. Continuation of course 11A. (CAN Bus 4)

**92. Internship and Field Work** (1-12) I, II, III. The Staff  
Laboratory—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 course 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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**99. Individual Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses**

**100. Intermediate Micro Theory** (5) I, II, III. The Staff

Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A-1B and Mathematics 16A or 21A with a grade of C- or better in each course. Price and distribution theory under conditions of perfect and imperfect competition; welfare economics. (Not open to students who have received credit for course 100M or Agricultural Economics 100A or 100B.)

**100M. Intermediate Micro Theory** (5) II. Silvestre

Lecture—4 hours; discussion—1 hour. Prerequisite: course 1A-1B; Mathematics 16A-16B or Mathematics 21A-21B each with a grade of C- or better. Theory of the consumer and the firm. Markets under perfect and imperfect competition. General Equilibrium and Welfare Economics. Use of calculus concepts and techniques. (Not open to students who have completed course 100, Agricultural Economics 100A or 100B.)

**101. Intermediate Macro Theory** (5) I, II, III. The Staff

Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A-1B and Mathematics 16A or 21A with a grade of C- or better in each course. Theory of income, employment and prices under static and dynamic conditions.

**\*105. History of Economic Thought** (4) III. The Staff

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Historical survey of economic doctrine: the Classical School and its antecedents, Neoclassical thought, criticism of classical thought, emergence of modern economic thought.

**106. The Great Economists—Ideas, Theories and Ideologies** (4) II. Tuma

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B. Perspectives on capitalism and markets by major economic thinkers. Emphasis on links to other social sciences. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Economics 1A-1B.

**110A. Economic History** (4) II. Tuma

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in Europe prior to the year 1700; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development.

**110B. Economic History** (4) I. The Staff

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of economic change in Europe from the year 1700 to the present; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development.

**111A. Economic History** (4) II. Walton

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.

**111B. Economic History** (4) III. The Staff

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.

**115A. Economic Development** (4) I. Kaneda; III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Covers major issues encountered in emerging from international poverty. Issues include 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.

**115B. Economic Development** (4) II. Kaneda

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Covers 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.

**116. Economic Systems** (4) II. Brzeski

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Critical examination of major economic systems; their goals and institutions; capitalism, fascism, and varieties of socialism; problems of economic planning in USSR, India, China, and other industrializing economies.

**117. The Soviet Economy** (4) III. Brzeski

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Survey of Soviet economic development: economic organization, methods of planning, and performance.

**\*118. Political Economy of Agrarian Reform** (4) III. The Staff

Lecture—3 hours; discussion—1 hour to be arranged. Prerequisite: courses 1A-1B or the equivalent. Theory and concepts of reform; illustrations from various periods and regions. Impact on economic development; problems of change and stability. Relationship to economic, social, and political institutions.

**119. Marxian Economics** (4) I. Roemer

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 100 (or 100M). Marxian economic theories, including theories of value, surplus value and exploitation; accumulation, the business cycle and crises; the role of the State and its relation to classes; imperialism. Writings of Marx and economists in the Marxian tradition will be studied.

**\*120. Economics of War and Peace** (4) III. Tuma

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B. Explores economic causes and effects of war; analyzes war and peace situations by comparing theory with practice in specific wars as case studies. Offered in odd-numbered years.

**121A. Industrial Organization** (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B, 100 (or 100M), or consent of 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.

**121B. Industrial Organization** (4) III. Lewis

Lecture—3 hours; to be arranged—1 hour. Prerequisite: course 121A. Public policy in a private enterprise economy; antitrust and other policies toward industry; economies of regulated industries.

**122. Ecology and Economics** (4) I. Gustafson

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A-1B or consent of instructor. Economics and populations as self-regulating systems; economic regulation of man's interaction with its environment. Topics: population growth and its economic determinants; optimal rates of use of exhaustible and renewable resources; implications of common property in resources; prospects for agricultural growth.

**125. Urban Economics** (4) I. Sullivan

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A, 1B, and 100. Explores the market forces behind the development of cities, explaining the existence of cities and the spatial distribution of activity within cities. Explores the effects of policies that address problems such as poverty, inadequate housing, congestion, pollution, inferior education, and crime.

**130. Public Microeconomics** (4) I. Silvestre

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 100M, 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) II. Helms

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 100M, or consent of instructor; course 101 recommended. Financing government expenditures. Efficiency and equity aspects of taxes, including personal income tax, property tax, and sales tax; tax loopholes and tax reform; revenue sharing; macroeconomic effects of taxation vs. debt financing.

**\*134. Corporation Finance** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, 11A; Mathematics 16A; 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 Economics 171A may not receive credit for this course.

**135. Money, Banks and Financial Institutions** (3) I. Mayer; III. The Staff

Lecture—3 hours. Prerequisite: courses 1A-1B or consent of instructor. Monetary institutions, the banking system, money creation, the Federal Reserve System, the tools of monetary policy.

**136A. Monetary Theory** (4) II. Makowski

Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Monetary theory; the impact of changes in the quantity of money and of liquid assets on money income.

**136B. Monetary Policy** (4) III. Mayer

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 135 and 136A. Evaluation of monetary policy, its impact on the economy and past performance, the problem of inflation.

**140. Econometrics** (4) III. Cameron

Lecture—3 hours; laboratory—2 hours. Prerequisite: courses 100, 101; Mathematics 16A-16B or 21A; Statistics 13. Introduction of 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 and exercises in applied economics.

**151A. Economics of the Labor Market** (4) I. Cameron

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or 100M. Theory of labor supply and demand; determination of wages and employment in the labor market. Economic theories of labor unions. Policy issues; labor force participation by married women; minimum wages and youth unemployment; effect of unions on wages. Offered in odd-numbered years.

**151B. Economics of Human Resources** (4) III. Triest

Lecture—3 hours; discussion—1 hour. Prerequisite: course 151A. 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. Offered in odd-numbered years.

**160A. International Microeconomics** (4) I. Lindert; II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, 100 or 100M, or consent of instructor. International trade theory: impact of trade on the domestic and world economies; public policy toward external trade. Students who have completed course 162 may receive only 2 units of credit for course 160A.

**160B. International Macroeconomics** (4) II, III. Woo

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B, 100 or 100M, and 101, or consent of

instructor. Macroeconomic theory of an open economy. Balance of payments adjustment mechanism, international monetary economics issues; international financial institutions and their policies. Students who have completed course 162 may receive only 2 units of credit for course 160B.

**162. International Economic Relations** (4) II. Woo  
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. Students who have completed course 160A or 160B may not receive credit for this course.

**170. Economy of the Middle East** (4) III. Tuma  
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 the Middle East. Consult department for course scheduling.

**\*171. Economy of East Asia** (4) I. The Staff (Chairperson in charge)  
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.

**172. Economy of South Asia** (4) II. Gustafson  
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 South Asia. Consult department for course scheduling.

**\*173. Economy of South-East Asia** (4) III. Glassburner  
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 South East Asia. Consult department for course scheduling.

**\*174. Economy of Europe** (4) III. The Staff  
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 Europe. Consult department for course scheduling.

**\*175. Economy of Sub-Saharan Africa** (4) I, II, III.  
The Staff (Chairperson in charge)  
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 the Sub-Saharan. Consult department for course scheduling.

**190. Topics in Economics** (4) I. Bonanno; III. Makowski  
Lecture-discussion-seminar—4 hours. Selected topics in economic analysis and public policy. Variable content. May be repeated for credit.

**192W. Internship in the Davis-in-Washington Program** (6-8) I, III. The Staff  
Internship—18-24 hours. Prerequisite: junior or senior standing in Economics; completion of 84 units of credits with a minimum grade-point average of 3.00; admission to the Davis-in-Washington Program. Internship in Washington, DC with associated research project. Students must arrange for a faculty sponsor before embarking on the internship. Maximum of 3 units will count toward satisfying Economics major requirements. (P/NP grading only.)

**194HA-194HB. Special Study for Honors Students** (3-3) I-II-III. The Staff (Nelson in charge)  
Independent study—2 hours; seminar—1 hour. Prerequisite: major in Economics with senior standing; consent of instructor. A program of research culminating in the writing of a senior honors thesis under the direction of faculty adviser. (Deferred grading only, pending completion of course.)

**197T. Tutoring In Economics** (1-5) I, II, III. The Staff (Chairperson in charge)  
Undergraduate tutors will lead small voluntary discussion groups affiliated with one of the depart-

ment's regular courses, under the supervision of, and at the option of the instructor in charge of the course. Units may not be counted toward satisfaction of major requirements. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

**200A. Microeconomic Theory** (5) II. The Staff (Agricultural Economics)  
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200M. Theories of behavior of individual economic agents. Characteristics of market equilibrium in perfectly competitive, monopolistic, and monopsonistic markets. (Same course as Agricultural Economics 200A.)

**200B. Microeconomic Theory** (5) III. Helms  
Lecture—4 hours; discussion—1 hour. Prerequisite: course 200A or consent of instructor. Introduction to theorems of welfare economics in a general equilibrium, linear economic models, externalities and market failure, social welfare functions. (Same course as Agricultural Economics 200B.)

**200C. Microeconomic Theory** (4) I. Makowski  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200A, 200B. Introduction to non-cooperative game theory with applications to microeconomic theory. Applications include principal-agent problems, bargaining under imperfect and perfect competition, and reputation formation. (Same course as Agricultural Economics 200C.)

**200D. Macroeconomic Theory** (5) II. Hoover  
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) III. Salyer  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 200B (may be taken concurrently) and 200D. Macrodynamic theory of income, employment, and prices.

**200M. Optimization in Economics** (5) I. Silvestre  
Lecture—4 hours; discussion—1 hour. Prerequisite: course 100 or 100M and 101, or Agricultural Economics 100A-100B and course 101; Mathematics 21A, 21B, and 21C. Mathematics for economists including linear programming, shadow pricing, linear algebra, convexity and concavity, non-linear programming, Kuhn-Tucker conditions. (Same course as Agricultural Economics 200M.)

**201A. History of Economic Thought** (4) III. Wegge  
Lecture—3 hours; discussion—1 hour. Economic thought from the classical Greece era to modern times.

**\*201B. History of Economic Thought II** (4) I. Shen  
Lecture—3 hours; discussion—1 hour. Origins and emergence of modern economic analysis. Offered in even-numbered years.

**\*202. Topics in Economic Theory** (4) I. The Staff  
Seminar—4 hours. Prerequisite: courses 200A through 200E or consent of instructor. Recent developments in economic theory.

**\*203A. Advanced Economic Theory** (4) I. Silvestre  
Seminar—4 hours. Prerequisite: courses 200A and 200B; Mathematics 127A recommended. Advanced topics in the theory of the firm; distribution theory; welfare economics.

**\*203B. Advanced Economic Theory** (4) II. Makowski  
Seminar—4 hours. Prerequisite: courses 200A and 200B; Mathematics 127A recommended. General equilibrium theory; capital theory; growth theory.

**204. Microeconomic Analysis** (5) I. Hazlett (Agricultural Economics)

Lecture—4 hours; discussion—1 hour. Prerequisite: course 100 (or 100M) or Agricultural Economics 100A-100B; Mathematics 21A, 21B and 21C (or Mathematics 16A, 16B and 16C). Open to advanced undergraduates with consent of instructor. Economic reasoning and social choice: behavior of firms and

households, theory of markets, partial and general equilibrium analysis, welfare economics, illustrations and applications. (Same course as Agricultural Economics 204.)

**\*205. Macroeconomic Analysis** (5) III. Hoover  
Lecture—4 hours; discussion—1 hour. Prerequisite: course 101; Mathematics 21A, 21B and 21C (or Mathematics 16A, 16B and 16C). Income, employment and the price level, money, income distribution, capital theory, growth theory, government policies, empirical models and methods.

**207. Contemporary Economics Seminar** (3-5) I.

Triest; II. Bonanno; III. Hoover  
Seminar—2 hours and discussion—2 hours (3 units); plus seminar presentation (5 units). Prerequisite: consent of instructor. Seminar series, consisting principally of outside speakers, on topics of current research. Discussion sections in which instructor and students review background material. Students who enroll for 5 units present seminar on their own work. (S/U grading only.) May be repeated for credit.

**\*208. Theory of Games** (4) III. Bonanno

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200M or consent of the instructor. Covers the most recent developments in game theory, with the focus changing from year to year. Topics include: refinements of Nash equilibrium, repeated games and the theory of social institutions, evolutionary game theory, games with bounded rationality, bargaining theory.

**209. Economics of Distributive Justice** (4) I. Roemer  
Lecture—4 hours. Prerequisite: course 200B. Introduction to social choice theory; envy-free allocations; axiomatic bargaining theory; axiomatic characterizations of resource allocation. Applications to modeling of the distributive theories of political philosophers J. Rawls, R. Dworkin, R. Nozick, and G.A. Cohen.

**210A. Economic History** (4) I. The Staff

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) II. Olmstead

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) III. Lindert

Seminar—4 hours. Prerequisite: a graduate course in economic history. Selected topics and issues, emphasis on current research. (Quarter offered to be flexible.)

**215A. Economic Development** (4) I. Jarvis (Agricultural Economics)

Seminar—3 hours; discussion—1 hour. Prerequisite: bachelor's degree in Economics (or the equivalent), or consent of instructor. Theories of economic development as they relate to developing nations; demographic problems; distribution issues in economic development. (Same course as Agricultural Economics 215A.)

**215B. Macroeconomic Development** (4) II. Kaneda  
Seminar—3 hours; discussion—1 hour. Prerequisite: course 215A. The macroeconomics of economic development; monetary policy problems; fiscal problems, international trade; specific country studies. (Same course as Agricultural Economics 215B.)

**215C. Economic Development in Agriculture: Policy and Planning** (4) III. —— (Agricultural Economics)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 215A or the equivalent. Agriculture in the structure of developing nations; its role in economic development; agriculture and national planning; sectoral policies relating to prices, inputs, productivity, and marketing; international aspects of trade, aid, and technical assistance; country case studies. (Same course as Agricultural Economics 215C.)

**\*215D. Development Programming** (4) III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 200B, 215A, 215B. Analysis of development plans, sectoral or regional programs and policies.

Application of macroeconomic models, input-output, Social Account Matrix (SAM) and programming techniques. Analysis and case studies of methods of project evaluation. (Same course as Agricultural Economics 215D.)

**\*216. Economic Systems** (4) I. Brzeski

Lecture—4 hours. Comparative study of economic systems, with reference to their organization and institutions, their values and goals, and their economic performance.

**\*217. Economics of Planning** (4) II. Brzeski

Lecture—4 hours. Theories and principles of economic planning under various economic systems.

**\*219. Marxian Economic Theory** (4) II. Roemer

Lecture—4 hours. Prerequisite: course 200B. Theory of exploitation and class, developed using a general equilibrium model; arguments for private property and rebuttals against; labor markets and capital markets in a capitalist economy; theory of public ownership.

**221A. Industrial Organization** (4) I. Bonanno

Lecture—3 hours; to be arranged—1 hour. Analysis of market structure, business behavior, and economic performance under conditions of limited governmental interference.

**221B. Industrial Organization** (4) II. The Staff

Lecture—2 hours; seminar—2 hours. Social standards and public policies toward the business sector of the economy.

**221C. Topics in Industrial Organization** (4) III.

Leavis

Lecture—3 hours; seminar—1 hour. Prerequisite: course 221A. Advanced topics in industrial organization and in applied microeconomics. Emphasis on current research. Contents may vary from year to year.

**\*222. Law and Economics** (4) II, III. The Staff

Lecture—2 hours; seminar—2 hours. Prerequisite: one year of law school; course 200A or consent of instructor. Studies the effects of legal rules on resource allocation and applies economic analysis to explicate problems in torts, property, and contracts.

**\*225. Urban Economics** (4) III. The Staff

Lecture—2 hours; discussion—2 hours. Prerequisite: course 200A or 204. Explains development of cities and land-use patterns within cities. Explores efficiency and equity effects of local spending and taxes. Analysis of urban problems such as transportation (congestion, pollution, mass transit), crime, and inadequate housing.

**230A. Public Economics** (4) II. Nelson

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200B. Measures of deadweight loss and consumer surplus; optimal commodity and income taxation; tax incidence; policy issues in personal taxation, corporate taxation, and social insurance; evaluation of effective tax rates.

**230B. Public Economics** (4) III. Helms

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200B. Effects of tax policies on economic behavior: production, consumption, savings, investment, and labor supply. Distribution and equity: social welfare evaluation and the measurement of inequity.

**\*230C. Topics in Public Economics** (4) III. Bonanno

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200B. Advanced topics in economics of the public sector, with emphasis on current research. Contents may vary from year to year.

**235A. Alternative Approaches to Monetary Analysis** (4) I. Mayer

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200D (may be taken concurrently). Focuses on relation between changes in money supply and changes in nominal GNP. Also discusses the effect of changes in money supply on interest rates.

**235B. Monetary Theory** (4) II. Hoover

Lecture—3 hours; discussion—1 hour. Prerequisite: course 235A. Emphasizes problem of finding an appropriate place for money in microeconomic/general equilibrium models. Consideration given to meaning of money, its relation to inflation and the real economy and to its role in models of finance.

**235C. Monetary Policy** (4) III. Mayer

Lecture—3 hours; discussion—1 hour. Organization of the Federal Reserve Bank, the definition of money, goals and tools of monetary policy, alternative targets for monetary policy, impact of monetary policy, the problem of lags, alternative policies.

**240A. Econometric Methods** (4) II. Burt (Agricultural Economics)

Lecture—4 hours; term paper. Prerequisite: Statistics 131B or 130B; Mathematics 22A. Statistical models and their use in estimation of economic relationships; single and multiple equation systems. (Same course as Agricultural Economics 240A.)

**240B. Advanced Econometrics: Theory** (4) I.

Havener (Agricultural Economics); III. \_\_\_\_\_ (Agricultural Economics)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240A; Statistics 131A, 131B, 131C recommended. Multivariate analysis, specification analysis, simultaneous equation models; identification, estimating methods, small sample properties. (Same course as Agricultural Economics 240B.)

**240C. Econometric Theory** (4) II. Wegge

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Finite sampling theory; nonlinear and dynamic econometric models; asymptotic distribution theory. (Same course as Agricultural Economics 240C.)

**240D. Topics in Econometrics** (4) III. Cameron

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240B. Advanced topics in nonlinear econometric modelling. Contents may vary from year to year. (Same course as Agricultural Economics 240D.)

**\*250A. Labor Economics** (4) II. Triest

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.

**\*250B. Labor Economics** (4) III. Triest

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.

**260A. International Economics** (4) I. Feenstra

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) III. Woo

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.

**260C. International Economics** (4) II. Feenstra

(Chairperson in charge)

Seminar—4 hours. Prerequisite: courses 260A and 260B. Survey of current literature in international trade theory.

**280. Orientation to Economic Research** (2) II.

Mayer.

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) II. Silvestre

Seminar—4 hours. Prerequisite: consent of instructor. Selected topics in economic analysis and public policy, focusing on current research. May be repeated for credit.

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Discussion—1-5 hours. Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

**299. Individual Study** (1-12) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor and graduate standing. (S/U grading only.)

**299D. Dissertation Research** (1-12) I, II, III. The Staff (S/U grading only.)

**Professional Course**

**397. Teaching of Economics** (2) I. Walton

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

(College of Letters and Science)

Henry T. Trueba, Ph.D., Director of the Division and Associate Dean of the College of Letters and Science (168 Kerr Hall)

G. Phillip Cartwright, Ph.D., Associate Director of the Division

Barbara G. Goldman, Ph.D., Special Assistant to the Director

David R. Wampler, Ph.D., Head of Teacher Education

Jon Wagner, Ph.D., Director of University-School Programs and of the Center for Cooperative Educational Research

Division Office, 180 Kerr Hall

Student Advising, 174 Kerr Hall (916-752-0757)

University-School Programs Office, 202 Wellman

**Faculty**

Donald G. Arnstine, Ph.D., Professor

Hugh C. Black, Ph.D., Professor Emeritus

G. Phillip Cartwright, Ph.D., Professor

Vincent A. Crockenberg, Ph.D., Lecturer

Linnea C. Ehri, Ph.D., Professor

Richard A. Figueroa, Ph.D., Professor

Maryann Gatheral, B.A., Lecturer in and Supervisor of Teacher Education

Barbara G. Goldman, Ph.D., Lecturer in and Supervisor of Teacher Education (Education, Applied Behavioral Sciences)

Jack E. Lowry, M.A.T., Lecturer in and Supervisor of Teacher Education

Barbara J. Merino, Ph.D., Associate Professor

Douglas L. Minnis, Ed.D., Senior Lecturer

Susan A. Ostergard, Ed.D., Lecturer in and

Supervisor of Teacher Education

Victor A. Perkes, Ed.D., Lecturer in and Supervisor of Teacher Education

2,3 Jonathan H. Sandoval, Ph.D., Professor

Julius M. Sassenrath, Ph.D., Professor

S. Joan Skinner, M.A., Lecturer in and Supervisor of Teacher Education

2 Carlton J. Spring, Jr., Ph.D., Professor

Leroy F. Troutner, Ph.D., Professor Emeritus

Henry T. Trueba, Ph.D., Professor

David R. Wampler, Ph.D., Lecturer in and Supervisor of Teacher Education

George D. Yonge, Ph.D., Professor

**University-School Programs Staff**

Marcia Renee Goodman, Ph.D., Coordinator of Publications, Center for Cooperative Educational Research

Jim Hahn, M.A.T., Associate Director for Teacher Research, Center for Cooperative Educational Research

Judith Kysh, M.A., Director, Northern California Mathematics Project

Keith R. Prior, B.A., Director, Northern California Curriculum Consultant Project

Paul Moreau, M.S., Coordinator, Northern California Science Project

Michael Moores, M.A., Consultant, Northern California Science Project

Laura Stokes, M.A., Director, Area 3 Writing Project  
 Jon Wagner, Ph.D., Director, Center for Cooperative  
 Educational Research

## Program of Study

The Division of Education does not offer an undergraduate major program. However, it does offer a minor.

## Minor Program Requirements:

Educational theory is considered to be the foundation or basic area for undergraduates to elect as a minor if they wish to (1) major in an allied program, (2) obtain a teaching credential, (3) obtain a master's degree in education or allied field, (4) obtain a Ph.D. degree in education, (5) enter a profession that focuses on work with people, (6) seek employment in governmental or industrial training programs, or (7) obtain a better understanding of the issues and concerns of public and private education.

### UNITS

<b>Education (minimum units)</b> .....	<b>20-23</b>
Education 110 or 111 .....	4
One course from Education 120 or 123 .....	4
Depth courses .....	12-15
At least 12-15 units from Education not used above: 100, 110, 111, 115, 117, 118, 120, 122, 123, 130, 132, 142, 145, 151, 152, 153, 163, or 175, chosen in consultation with an Education adviser.	

**Minor Advisers.** All faculty members who teach undergraduate courses.

## Teacher Education Curricula

For a statement of complete requirements and appointments with credential advisers, contact the divisional Student Advising Office, 174 Kerr Hall. Interested students are urged to do this as *early as possible* in their academic career.

Applicants to the basic (multiple subject or single subject) credential programs should contact the Student Advising Office for forms and procedural information early in the fall quarter of their senior year.

**Credential Counselors: Multiple Subject.** M. Gatheral, S. A. Ostergard, S. J. Skinner, D. R. Wampler.

**Bilingual Emphasis.** B. J. Merino.

**Credential Counselors: Single Subject.** J. E. Lowry, V. A. Perkes.

**Graduate Adviser.** D.R. Wampler (Credential Program).

**Graduate Study.** The Division offers programs of study and research leading to the M.A. degree in Education. Detailed information regarding graduate study may be obtained by writing the Graduate Adviser, Division of Education.

**Graduate Adviser.** G.D. Yonge (M.A. degree).

## Courses in Education

### Lower Division Course

**98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
 Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

### Upper Division Courses

**100. Introduction to Schools** (4) I, II, III. Lowry, Minnis, Wampler  
 Lecture—3 hours; field work—3 hours. Prerequisite: upper division standing. Study of occupational concerns of teachers; skills for observing classroom activities; school organization and finance; school reform movement; observing, aiding and tutoring in schools.

**110. Educational Psychology: General** (4) I, II, III. Ehri, Sassenrath, and staff  
 Lecture-discussion—4 hours. Prerequisite: Psychology 1; upper division standing. Learning processes, cognitive development, individual differences, testing and evaluation. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: introductory course in psychology.

**\*111. Introduction to Psychopedagogics** (4) I, II, III. Yonge

Lecture-discussion—4 hours. Prerequisite: Psychology 1 and upper division standing. Introduction to the human science of pedagogics (education) with special emphasis on the psychopedagogic perspective. Such topics as the pedagogic situation, learning and becoming, teaching and the lesson structure, and the methods of pedagogics will be considered.

**114. Quantitative Methods in Educational Research** (4) I. Yonge

Lecture-discussion—4 hours. Prerequisite: two years of high school algebra. Problems and methods in data analysis. Design of research projects. Some consideration of procedures suited to digital computers.

**115. Educating Handicapped Children** (2) II, III. Cartwright, Figueroa, Spring

Lecture—2 hours. Prerequisite: upper division standing. Educational issues and processes involved in teaching handicapped children.

**117. Psychology of Reading** (4) I. Ehri

Lecture-discussion—4 hours. Prerequisite: Psychology 1 and upper division standing. Theory and research on psycholinguistic processes involved in learning to read. Topics include reading readiness, word recognition and spelling, knowledge of the orthographic system, phonological awareness, interactive processes, influence of dialect, difficulties of poorer readers.

**\*118. Comprehension In Reading and Listening** (4) II. Spring

Lecture-discussion—4 hours. Prerequisite: upper division standing. Theory and research of comprehension and learning of verbal material. Written and spoken material of two types, narrative and expository, considered. Topics include vocabulary acquisition as well as instruction of verbal skills at the sentence and passage levels.

**120. Philosophical and Social Foundations of Education** (4) I, II, III. Arnstine and staff

Lecture-discussion—4 hours. Prerequisite: upper division standing. Philosophical, historical, and sociological study of education and the school in our society. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 17B or Philosophy 14.

**122. Civil Rights of Teachers and Students** (4) I, III. Crockenberg

Discussion—4 hours. Prerequisite: upper division standing. Rights of teachers and students under the U.S. and California Constitutions and under Federal and State laws. Emphasis on the rights of speech, press and assembly, religious autonomy, due process, equal protection and privacy. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 1.

**123. John Dewey and the Foundations of Education** (4) I. Arnstine

Lecture-discussion—4 hours. Prerequisite: upper division standing. The philosophical and social foundations of education as interpreted by Dewey. While focusing on his critique of American education and his systematic proposals for reform, attention will also be given to criticisms of Dewey.

**\*130. Issues In Higher Education** (4) III. Crockenberg, Arnstine, Milton (Mathematics)

Discussion—3 hours; field work—3 hours. Prerequisite: upper division standing or 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.

**132. Church, State and School** (4) III. Crockenberg

Discussion—4 hours. Prerequisite: upper division standing; course 122 or the equivalent. Analysis of the decisions of the United States Supreme Court applying the free exercise and establishment clauses of the first amendment to the relationship between church, state, and schools. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 1.

**142. School Desegregation and the Civil Rights Movement** (4) I. Crockenberg

Discussion—4 hours. Prerequisite: upper division standing; course 122 or an equivalent course emphasizing legal analysis. The law of school desegregation and its development in the context of the broader movement for civil rights led by Martin Luther King, Jr., with particular attention to the history of school desegregation in California.

**145. Aesthetics in Education** (4) II. Arnstine

Lecture-discussion—4 hours. Prerequisite: upper division standing. Considers the role of the arts in education. Examines various conceptions of the nature of art and aesthetic experience, and relates this to instructional procedures.

**\*150. Tutoring Children and Youth** (2) I, II, III. The Staff (Director in charge)

Lecture—1 hour; tutoring or teacher aide—3 hours. Prerequisite: upper division standing. Planning, choosing, and implementing strategies for tutoring or working as a teacher's aide in schools. Analysis of factors that affect pupil performance in schools. May be repeated twice for credit when tutoring is done in different major area.

**151. Language Development in the Chicano Child** (3) I. Merino

Lecture—3 hours. Prerequisite: some knowledge of Spanish and linguistics recommended. Bilingualism, first and second language acquisition, bilingual education, language assessment, Chicano Spanish, and the role of dialect varieties in the classroom.

**152. Communication Skills for Bilingual Teachers** (3) III. The Staff (Merino in charge)

Lecture-discussion—2 hours; field work—3 hours. Prerequisite: course 151; Spanish 2, 8A-8B. The development of communication skills of prospective educators with an emphasis on the study and use of standard Spanish and Southwest Spanish dialects in teaching science, mathematics, social science, music, art, and language arts to bilingual elementary school pupils.

**153. Cultural Diversity and Education** (2) I, III. Merino, Minnis, and staff

Lecture-discussion—2 hours. Prerequisite: upper division standing. 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.

**160. Peer Counseling** (2) I, II. The Staff

Seminar—2 hours. Prerequisite: upper division standing; consent of instructor. Study of peer counseling techniques and development of peer counseling skills. (P/NP grading only.)

**163. Guidance and Counseling** (4) III. Figueiroa, Sandoval, and staff

Lecture—4 hours. Prerequisite: course 110 (may be taken concurrently). 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.

**\*175. Critical Thinking in Classrooms** (4) III. Minnis, Friedman (Philosophy)

Lecture—2 1/2 hours; discussion—1 1/2 hours. Prerequisite: upper division standing. Critical thinking skills and rigorous analysis of argumentation in classrooms on the basis of philosophical and educational theory. Enables teachers to utilize existing school curricula to engage children in discussions of significant scientific, social, ethical, and philosophical issues.

**180. Computers in Education** (3) I, II, III. Cartwright and staff

Lecture—1 hour; seminar—1 hour; laboratory—3 hours. Prerequisite: upper division standing. Applications of computers in education as instructional, intellectual, and communication tools.

**192. Internship** (1-5) I, II, III. The Staff (Director in charge)

Discussion—1 hour; field work—3 to 15 hours; term paper. Prerequisite: upper division standing; consent

of instructor. Work-learn experience in schools under supervision of a faculty member. May be repeated for credit. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Director in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Director in charge)

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

### Graduate Courses

**200. Educational Research** (3) III. Spring, Ehri

Seminar—3 hours. Prerequisite: course 114 or the equivalent. Study of educational research and evaluation designs, review of computer solutions to related statistical procedures. Case problems provide practice in designing and reporting research.

**201A. Ethnographic Research in Schools I: Current Theory and Practice** (4) II. Trueba

Lecture—4 hours. Prerequisite: graduate standing. Review of current literature from anthropology and society related to schools, with 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.

**201B. Ethnographic Research in Schools II: Field-Based Research Projects** (4) III. Trueba

Discussion—4 hours. Prerequisite: graduate standing and course 201A. 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.

**205. The Concept of Mind in Teaching** (4) III. Arnsline

Seminar—4 hours. Philosophical analysis of the problems of educational practice which are created, aggravated, and sometimes solved by varying conceptualizations of mind and thinking.

**207. Concepts of the Curriculum** (3) I. Arnsline, Crockenberg

Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Development of the skills of philosophical analysis in the examination of curriculum theory and practice, including the conceptual analyses of purposes, of the organization of subject matters, and the methods of instruction.

**208. Education and the Law** (4) II. Crockenberg

Seminar—4 hours. Prerequisite: graduate standing. Analysis of how selected areas of school law have developed, in particular the rights of students and teachers under the First and Fourteenth Amendments to the U.S. Constitution, criticism of the present state of that law, and an understanding of needed legal reforms.

**209. Pedagogics** (4) III. Yonge

Seminar—4 hours. Critical analysis of the literature available in English dealing with theoretical and practical issues in education in terms of Pedagogics (i.e., an existential phenomenological approach to the systematic study of education).

**211. Psychopedagogics** (4) II. Yonge

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Phenomenological approach to the psychological aspects of the educational situation (psychopedagogics). A critical consideration of how psychopedagogics contributes to the theory and practice of education.

**212. Language and Intellectual Development** (4)

III. Ehri

Seminar—4 hours. Prerequisite: consent of instructor. Theory and research on the development of language and thought in children; emergence of grammatical, semantic systems, and operational thought; implications for education.

**213. Individual Assessment** (4) III. Sandoval

Lecture—4 hours. Prerequisite: courses 114 and

219, admission to school psychology credential program. 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.

**\*214. Assessment of Children's Personality** (4) II. Sandoval

Lecture—3 hours; field work—3 hours (minimum). Prerequisite: admission to school psychology credential program; courses 213 and 218; and familiarity with basic personality theory and theories of motivation. Study of the projective hypothesis; concepts of personality and its measurement; legal and ethical issues in personality assessment; interviewing techniques in assessment of social and affective functioning; specific measures in personality assessment; reporting on personality assessments; school interventions. Offered in even-numbered years.

**215. Motivation and Behavior Modification** (4) I. Spring

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Factors related to influencing behavior in educational settings, including analyses of intrinsic and extrinsic motivation, psychological reactance, locus of control, achievement attribution, and behavior modification.

**218. Testing Minority Children** (4) I. Figueiroa

Lecture—3 hours; field work—3 hours. Prerequisite: admission to school psychology program or to M.A. bilingual education program or consent of instructor. Emphasizing tests and techniques that are appropriate for use with Hispanic students. The use of multicultural pluralistic assessment. Review studies and guidelines on use of tests with minority children.

**219. Educational Testing and Evaluation** (3) II. Sassenrath

Seminar—3 hours. Prerequisite: courses 114 and 200 or consent of instructor. Study of test theory as it applies to research and evaluation in education, with an emphasis on general ability and reading tests.

**\*251. Research in Bilingual and Second Language Education** (3) II. Merino

Seminar—3 hours. Prerequisite: course 151; knowledge of a foreign language. 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 classroom, use of the vernacular in classroom.

**252. Multicultural Teaching and Curriculum** (3) III. Merino

Seminar—2 hours; field work—3 hours. Prerequisite: graduate standing or consent of instructor. Cross-cultural research on socialization, motivation, language acquisition and cognition and its application to effective classroom strategies and curriculum development for minority students. Students will develop and implement multicultural curriculum as well as use ethnographic research techniques in an educational setting.

**253. Language and Literacy in Linguistic Minorities** (3) II. Merino

Seminar—2 hours; fieldwork—3 hours. Prerequisite: familiarity with another language and culture; graduate standing. 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.

**270A. Reading Diagnosis and Prescription** (3) III. Gatheral

Lecture-discussion—3 hours. Prerequisite: course 300 or the equivalent. The diagnosis and treatment of reading disabilities and the recognition of reading abilities. Analysis of clinical techniques, testing, use of material and teaching procedures.

**\*270D. Clinical Laboratory and Seminar in Reading Problems** (5) II-III. Gatheral

Seminar—2 hours; laboratory—9 hours. Prerequisite:

consent of instructor. Development and application of diagnostic and prescriptive techniques in a reading clinic. (Deferred grading only, pending completion of two-quarter sequence.)

**271. Recent Developments in Social Studies Education** (3) III. Lowry

Lecture—2 hours; field work—2 hours. Prerequisite: consent of instructor. Analysis of the rationales, goals, objectives, and assumptions about learning and teaching strategies, and evaluation techniques in selected social studies curriculum projects.

**272. Recent Developments in Science Education**

(3) II. Perkes

Lecture—3 hours. Prerequisite: consent of instructor. Analysis of contemporary science programs with special emphasis upon philosophical, psychological and pedagogical attributes of their design; trends, issues, and research in science curriculum and instruction.

**\*273. Research in Mathematics Education** (3) III. Ostergard

Lecture-discussion—3 hours. Review of current issues and research in mathematics education.

**275. Effective Teaching** (4) I. Minnis

Seminar—4 hours. Review of research on the relationship of effective teacher behavior and student learning. Use of research on teacher effectiveness to develop teaching strategies. Ways to decide on the most appropriate instructional strategies in specific teaching situations.

**277. Staff Development and Supervision of Teachers** (4) III. Minnis

Seminar—4 hours. Prerequisite: graduate standing. Use of research and legislative guidelines to design staff development for school personnel. Emphasis on school change resulting from staff development programs and the supervision techniques. Supervision as a diagnostic skill and means of teaching teachers skills. Offered in odd-numbered years.

**290C. Research Conference in Education** (1) I, II,

III. The Staff (Director in charge)

Discussion—1 hour. Prerequisite: graduate standing. Presentations and critical discussions of research in education by graduate students with their major professor. May be repeated twice for credit. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Director in charge)

(S/U grading only.)

**299. Individual Study** (1-6) I, II, III. The Staff (Director in charge)

Independent study—3-18 hours. Individual study under the direction of a faculty member. (S/U grading only.)

**299D. Research** (1-6) I, II, III. The Staff (Director in charge)

Independent study—3-18 hours. Research for individual graduate students. (S/U grading only.)

### Professional Courses

**300. Reading in the Elementary School** (4) I.

Gatheral, Skinner

Lecture—3 hours; field work—3 hours. Prerequisite: graduate standing. Principles, procedures, and curriculum materials for teaching of reading. Includes decoding skills with a special emphasis on phonics, comprehension skills, study skills, and reading in the content areas.

**301. Reading in the Secondary School** (4) II, III.

Gatheral and staff

Discussion—4 hours. Prerequisite: must be teaching or student teaching. Principles, procedures, and materials to help secondary school teachers improve the reading competence of their students. The teaching of phonics, structural analysis, and alternative methods of coping with the problem reader in the classroom.

**302. Language Arts in the Elementary School** (2)

I. Skinner

Lecture—2 hours. Prerequisite: graduate standing. Principles, procedures, and materials for the teaching of oral and written expression, listening skills, drama, and children's literature in elementary schools.

**303. Art Education (3) II. The Staff (Director in charge)**

Lecture-discussion—2 hours; laboratory—2 hours. Prerequisite: admission to multiple subject 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 with emphasis on cross-discipline exploration.

**304A. Teaching in the Elementary Schools (5-8) I.**

The Staff (Wampler in charge)

Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Selection and organization of teaching materials. Introduction to techniques of diagnosing school achievement of children.

**304B. Teaching in the Elementary Schools (5-8) II.**

The Staff (Wampler in charge)

Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 304A; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Current conceptions of elementary school curriculum, emphasis on contributions from the social, biological, and physical sciences. Emphasis on effective teaching methods.

**304C. Teaching in the Elementary Schools (5-8) III.**

The Staff (Wampler in charge)

Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 304B; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in preschool or elementary schools. Evaluation of teaching materials including audio-visual aids. Current elementary school curriculum with emphasis on contributions from fine arts and humanities.

**305A. Teaching in the Middle Grades (5-8) I.**

The Staff (Wampler in charge)

Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: acceptance into a teacher education 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.

**305B. Teaching in the Middle Grades (5-8) II.**

The Staff (Wampler in charge)

Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 305A; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in intermediate grades. Selection, organization, and evaluation of teaching materials including audio-visual aids. Effective teaching methods in grades 4-9.

**305C. Teaching in the Middle Grades (5-8) III.**

The Staff (Wampler in charge)

Lecture—2 hours; seminar—2 hours; student teaching—15-30 hours. Prerequisite: course 305B; acceptance into a teacher education program. Supervised teaching in regular or special education classrooms in junior high school. Current conceptions of the junior high school with emphasis on effective teaching methods, and selection of curriculum materials. Alternative programs.

**306A-306B-306C. Teaching in Secondary Schools (5-9) I, II, III.**

The Staff (Wampler in charge)

Seminar—2 hours; student teaching—10-21 hours. Prerequisite: acceptance into teacher education program. Supervised teaching in regular or special education secondary school classrooms. Techniques for classroom communications; constructing goals and objectives; assessment of learning; special problems of adolescents; audio-visual techniques. Must be repeated by undergraduates for a total of 15 units; 21 units by graduates in Physical Education and Music, and 24 units by all other graduate students.

**307. Methods in Elementary Science (2) II.**

Wampler, Ostergard

Lecture-discussion—2 hours. Prerequisite: acceptance into teacher education program. Principles, procedures, and materials for teaching the biological

and physical sciences in elementary schools.

**308. Methods in Elementary Social Studies (2) II.**

Wampler

Lecture-discussion—2 hours. Prerequisite: acceptance into a teacher education program. Principles, procedures, and materials for teaching history and the social sciences in elementary schools.

**309. Early Childhood and Kindergarten Education (3) III.**

Skinner

Lecture—3 hours. Prerequisite: upper division or professional standing. Methods, materials, and history of educational programs for the preschool through primary grades. Development of curriculum methods and materials which stress integration of appropriate subject areas with emotional, social, creative, physical, and cognitive development.

**\*313. Secondary Art Methods (3) I.**

The Staff (Director in charge)

Lecture-discussion—2 hours; laboratory—3 hours. Prerequisite: Art major or secondary teaching specialty, or consent of instructor. Current readings and discussion of contemporary art and teaching. Formulation of curriculum and practice of techniques used in secondary schools. Observation and evaluation of several secondary art programs.

**322. Methods in Secondary Social Studies (4) I.**

Lowry

Lecture—4 hours. Prerequisite: acceptance into credential program or consent of instructor. Methods and materials of teaching concepts and thinking skills. Recent developments in applying basic skills to the teaching of social studies.

**323. Secondary School Curriculum: Science (4) I.**

Perkes

Lecture—4 hours. Conceptions of science curriculum and instruction. Scientific knowledge and methods as applied to course design and teaching; rationale and objectives of science programs; laboratory as an environment for learning. Lecture, laboratory, observation, and participation in public schools.

**324. Teaching Methods in Mathematics (3) II.**

The Staff (Director in charge)

Lecture—3 hours. Prerequisite: acceptance into a teacher education program; student teaching (concurrently); a mathematics background or consent of instructor. Methods and curriculum for teaching mathematics at the secondary level (grades 9-12). Review of innovative mathematics programs in the State.

**341. Teaching in Colleges and Universities (3) III.**

Minnis

Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing in any department or program. Analysis of course objectives. Teaching techniques for college instruction with emphasis on lecture and discussion. Evaluation of student performance and grading. Course and instructor evaluations. (S/U grading only.)

**342. Teaching Practicum for International Students (2) II.**

Minnis

Lecture-discussion—2 hours. Prerequisite: graduate standing in any department or program. Intended for international students. Teaching techniques for college instruction with special recognition of language and cultural differences experienced by international instructors. Information on and practical experience with the organization and oral presentation of college-level subject matter. (S/U grading only.)

**\*351. Advanced Fieldwork in Bilingual Education: Teaching (3-5) I.**

The Staff (Merino in charge)

Seminar—2 hours; field work—3-9 hours. Prerequisite: acceptance into a bilingual education specialist program. Discussion, analysis, and implementation of methods, techniques, and material in the bilingual/cross-cultural classroom, including team teaching with paraprofessionals, implementation of language-use models in the classroom, lesson planning, selection and use of bilingual/cross-cultural materials.

**\*352. Advanced Fieldwork in Bilingual Education: Evaluation and Supervision (3-5) II.**

Merino

Seminar—2 hours; field work—3-9 hours. Prerequisite:

site: upper division standing; acceptance into a bilingual/cross-cultural specialist credential program. Provides opportunity to acquire evaluation and supervisory skills in the field under the supervision of University staff and an experienced program evaluator/supervisor in bilingual/cross-cultural education.

**361A-361B-361C. School Psychology: Introduction (3-3-3) I-II-III.**

Sandoval and staff

Seminar—2 hours; fieldwork—3 hours (minimum). Prerequisite: admission to school psychology credential program. History and theory of school psychology. Application of psychological theory to educational problems. Reading and mathematics curriculum for school psychologists. Crisis intervention and counseling in the schools. Fieldwork in schools and other institutions serving children. (S/U grading only.)

**362A-362B-362C. School Psychology: Advanced (3-3-3) I-II-III.**

Sandoval, Figueroa

Seminar—2 hours; field work—4 hours. Prerequisite: courses 361A-361B-361C, 213, 218, 219. Theory and techniques of school-based mental health consultation and non-biased assessment. Legal principles related to special education practice and school psychology. Advanced case study techniques. (S/U grading only.)

**363A-363B-363C. School Psychology: Internship (8-12) I, II, III.**

Sandoval, Figueroa, and staff

Seminar—2 hours; internship—18-32 hours. Prerequisite: admission to school psychology credential program; courses 361A-361B-361C, 362A-362B-362C, 213, 218, 219. Individual assessment and program evaluation, mental health consultation, intervention strategies to promote the school learning and adjustment of children. Selected topics in school psychology. (S/U grading only.)

**\*370. Advanced Fieldwork in Reading (2-6) I, II, III.**

Gatheral

Seminar—1 hour; fieldwork—3-15 hours. Prerequisite: acceptance into a reading credential program. Fieldwork at elementary/secondary levels, using diagnostic/prescriptive techniques, and studying district in-service programs. May be repeated twice for credit up to a total of 6 units. (S/U grading only.)

**\*380. Logo Programming in Education (2) II.**

Spring

Lecture—1 hour; laboratory—2 hours. Prerequisite: consent of instructor. Computer programming in Logo, a high-level computer language which is appropriate for instruction in elementary and secondary grades.

**398. Group Study (1-5) I, II, III.**

The Staff (Director in charge)

(S/U grading only.)

**399. Individual Study (1-5) I, II, III.**

The Staff (Director in charge)

(S/U grading only.)

## Education Abroad Program

Carolyn F. Wall, Ph.D., Campus Coordinator,  
Assistant Vice Chancellor for International Programs, 150 Mrak Hall (916-752-0392)

Program Office, 323 South Hall (916-752-3014)

### Programs of Study

The Education Abroad Program (EAP) of the University of California offers students who meet the minimal admission requirements the opportunity to experience a different culture while making progress toward degree objectives. Students interested in the language, literature, art, culture, history, or governmental or social institutions of the countries or areas where study centers are located will gain substantially from first-hand academic and practical experience. The same is true for students of foreign affairs. All students, whatever their field of study, will broad-

en their outlook and gain new skills as the result of study in a foreign country. The academic—and non-academic—debts and credits of participation in the EAP should be weighed carefully prior to departure, however.

### Application

Normally, students participate in the program during their junior year, but a limited number of students may be selected for participation as seniors. A few programs are open to sophomores and to graduate students as well. Students considering study abroad with the EAP should contact the EAP Office early in the fall quarter concerning application and filing deadlines. This is important, as deadlines for some centers, including the United Kingdom and Ireland, are in early November.

Application forms are available from the EAP Office. A provisional academic planning form, prepared in consultation with the EAP Adviser and the major adviser, must be submitted along with the completed application to the EAP Office prior to the appropriate deadline. Applications received after the official deadline cannot be considered.

Students who do not meet the minimal requirements for acceptance (see under Education Abroad in the Introduction section) must consult the Campus Coordinator. Students who will have accumulated more than 145 units prior to the beginning of their planned year of study abroad must receive permission from the Campus Coordinator before submitting an application; the probability of such students being accepted is low.

### Selection

The Academic Senate Committee on the Education Abroad Program is intimately involved in the selection of EAP participants on the Davis campus. This committee strongly recommends that prospective participants take appropriate courses dealing with the country of their interest in preparation for the year abroad. Applicants who are taking or have completed such courses at the time of the campus selection process tend to have an increased probability of receiving the endorsement of the Committee, other factors being equal. Lists of suggested courses and reading materials are available in the EAP Office.

Once the completed application materials have been filed, an applicant will be interviewed by a selection committee consisting of faculty and EAP returnees. Among other things, academic goals, knowledge of the host country and the United States and proficiency in the language of the host country, when applicable, will receive considerable attention during the interviews.

Files of applicants receiving the endorsement of the Senate Committee on EAP are forwarded to the Systemwide Office of the EAP on the Santa Barbara campus, where further selection decisions will be made.

### Academic Program

In most cases, students from the University of California live as the students of the host country do and attend the same courses, taught by faculty of the host country in their own language. Thus, language skills are very important. To aid adjustment of UC students to different, often unfamiliar educational practices, tutorials are a part of the academic program of most centers. Tutorials also assist in overcoming language problems and provide cultural background information presupposed in the courses. Tutorials are taught by graduate students or junior staff of the host university and are offered in association with courses in which a sufficient number of UC students have enrolled.

To assist in the adjustment and the academic work of the students, faculty members of the University of California serve as Directors and/or Associate Directors at most of the study centers abroad.

The academic program of each student includes: (1) an intensive preparatory course in the language of the host country (except for the programs in the United Kingdom, Ireland, Canada, Australia, Egypt,

Ghana, Hungary, Kenya, and New Zealand); (2) a full year of academic courses; (3) broad opportunity to audit courses within the host university. It is expected that students will complete a minimum of 36 units during the academic year in addition to units earned in the intensive language program.

### Graduation Requirements

All prospective applicants, but particularly students who intend to study abroad during their senior year, should plan their course programs for Davis and abroad carefully in order to satisfy University, College, and major requirements for the degree. The provisional planning form is intended to take care of this, but a few potential problems deserve emphasis.

Although units and grade points earned in the EAP are incorporated into the University transcript and GPA, the major departments and programs retain the right to determine which EAP courses will be accepted in satisfaction of major requirements. Several major programs have identified key upper division courses which must be completed in residence at Davis. Major advisers should be consulted early so that the pre-departure program at Davis will be planned appropriately.

All degree candidates must meet the University residence requirement. Students planning to graduate immediately upon completion of participation in the EAP may satisfy residence requirements within the final 45 units preceding entrance into the EAP. Otherwise, subject to prior approval of the major department or program concerned, the requirement may be satisfied as follows: Within the final 90 units earned toward the degree, 35 units must be completed in residence in the student's College or School, 12 units of which must be completed after returning from EAP participation. With this option, no more than 55 units taken abroad may be applied toward the unit requirement for graduation. The applicant's College or School Dean is the source for information on the University residence requirement and additional residence requirements that may be imposed.

Participants who satisfy all degree requirements while abroad and expect to graduate upon completion of the year abroad should file for candidacy to receive the degree in September. Unfortunately, transcripts from abroad take a long time to get to the home campus and are not received in time for EAP returnees to be included on the June degree list. Such returning students may participate in the June commencement ceremony, however.

### Study Centers

At any one center, the courses and fields of study open to UC students may be limited. Moreover, each of the host institutions has special areas of excellence and strength. The listing of centers below incorporates selected information concerning these points. More detailed information is available in the flyers describing each of the centers and from the EAP adviser in South Hall.

In addition to the programs listed below, Davis students have access to certain special programs, such as the UC Davis exchange with French language universities in Quebec. Information can be obtained at the EAP Office in South Hall.

### Europe

**Austria.** The program is small and is designed to offer an opportunity to pursue a specialized interest to a limited number of highly qualified students. A compulsory intensive language course at Georg-August University in Göttingen, Germany, precedes the beginning of the academic year. All courses are taught in German.

**University of Vienna.** Eastern European studies (Balkans, Soviet Union), fine arts (history of art, music, theatre arts), folklore, history.

**Denmark.** A compulsory summer intensive language program precedes the academic year and continues through the fall semester. Instruction is in Danish, though examinations in English may be available. Most students concentrate on their major or a closely

related field; independent study under tutorial supervision is expected. Students may also apply to the Summer Intensive Language Program only as a short-term program option.

**University of Copenhagen.** Broad availability of humanities and social sciences. Programs in communications, economics and international politics, history, linguistics, and medieval studies are of particular interest.

**France.** A compulsory intensive language course precedes the beginning of the academic year. All courses in the universities are taught in French. UC faculty directors are in residence at Bordeaux, Grenoble, and Paris.

**University of Bordeaux.** Broad areas of the humanities and social sciences. The Institute of Political Science and the Institute of Prehistory (Anthropology) are well known.

**University of Grenoble.** Mainly in the social sciences through the Université des Sciences Sociales (Grenoble II); some humanities. Offerings in anthropology and psychology are limited. Not suitable for physical or life sciences.

**University of Lyon.** Social sciences, art history; modern languages and linguistics; Arabic studies.

**Paris Center for Critical Studies.** Film theory, literary criticism, philosophy, theater (literature, criticism, and history), historiography, and limited art history.

**Pau-Paris.** Participants spend the first semester at the University of Pau. At the end of January, they move to Paris to take courses at the *Paris Center for Critical Studies*. In addition to required core courses in French civilization, students take courses in humanities and social sciences, with emphasis on comparative cultural studies, French language, and critical studies.

**University of Pau.** Pau-Paris core courses, humanities, social sciences. Program in Basque studies is of special interest. Scholarships available for students of Basque or Bearnais cultural background.

**University of Poitiers.** Humanities is taught, with major emphasis in history and medieval studies; mathematics; physics.

**Germany.** A compulsory intensive language program precedes the beginning of the academic year. All courses are taught in German.

**Georg-August University, Göttingen.** Broad curriculum covering most majors. Excellent science programs, with substantial strength in biology, chemistry, and physics. Space in laboratory courses in biology and psychology may be limited.

**Hungary. Karl Marx University, Budapest.** A fall semester or full-year program jointly sponsored by UC and the University of Wisconsin at Madison. Offerings developed for the program include conversational Hungarian and courses in Central European history, culture, economics, and economic history.

**Italy.** A compulsory intensive program in language and history precedes the beginning of the academic year. Students who have completed only one year of Italian may become eligible for participation by attending a summer intensive-language program in Italy in order to attain the required third-year level, followed by the normal compulsory intensive-language program in Padua. A UC faculty director resident in Padua administers all EAP programs in Italy. All courses are taught in Italian.

**University of Bologna.** Humanities, social sciences, economics, history.

**University of Padua.** History of art (including archaeology), Italian literature (including linguistics), and political science (which includes history, social sciences, geography, and demography, as well as political science in the American sense). Sciences are not available for UC students.

**University of Venice.** Economics, history; history of art.

**Conservatorio di Musica G.B. Martini, Bologna.** Individual instruction in music performance; composition; music history. An audition is required for admission.

*Accademia delle Belle Arti di Venezia, Venice.* Art studio and some art history. Colored slides of portfolio of artistic work must be submitted for admission.

*Il Bisonte International School of Graphic Arts.* Etching and lithography for advanced undergraduates. Colored slides of portfolio of etchings must be submitted for admission.

**Norway.** Knowledge of Norwegian is not required, but a compulsory intensive course in Norwegian (mid-June to mid-August) precedes the beginning of the academic year. Intensive language study is continued during the fall semester. All courses are taught in Norwegian.

*University of Bergen.* Humanities, social sciences, natural sciences, and mathematics are available, but space in the sciences may be limited. The usual pattern is study of a single subject, usually the major or a closely allied field, for the entire year.

**Portugal.** A six-week summer intensive-language program at UC Santa Barbara is required before departure for the academic year program. Students enroll in courses taught through the Department for Foreign Students as well as regular offerings at the *University of Lisbon*.

*University of Lisbon.* Portuguese language, literature, and culture; classical and romance languages, literature, and linguistics; history, philosophy, geography, art history, and cultural anthropology.

**Spain.** A compulsory intensive language program precedes the beginning of the academic year. All instruction is in Spanish.

*University of Alcala de Henares.* Spanish language and literature, history and economics.

*University of Barcelona.* Humanities (with emphasis on Spanish art, history, literature, linguistics) and some social sciences. Courses developed for the Center and taught by the University of Barcelona form the core of the program. EAP students are required to take at least one regular year-long course in the University of Barcelona. (This is a cooperative program with the University of Illinois.)

*University of Madrid.* Humanities and some social sciences. The core program, developed for the UC Study Center and other American programs, concentrates on Spanish studies in the broadest sense. Core and Study Center courses are taught by Spanish faculty. EAP students are required to take one regular year-long course in the University of Madrid.

**Sweden.** Compulsory intensive language course during the summer for students who are not already fluent in Swedish. Language study continues during the fall semester for all students until the student has gained the equivalent of two years of Swedish. Most courses are taught in Swedish, but a few courses offered in English may be available.

*University of Lund.* Broad curriculum. Excellent science programs.

**United Kingdom and Ireland.** The program, which includes 15 institutions, is administered by a director and associate director located in London. The UK program is highly competitive, largely due to its popularity with students. Following selection for participation by the EAP administration, a student must still be accepted by a specific department in one of the host institutions. In many host institutions, the student can pursue studies in that department only. Participating institutions are

England: *University of Birmingham, University of East Anglia, University of Exeter, University of Hull, University of Kent at Canterbury, University of Lancaster, University of Leeds, University of Sussex, University of York.* Occasionally, students may be placed on an *ad hoc* basis at other institutions.

Ireland: *University College, Cork, University College, Galway.*

Scotland: *University of St. Andrews, University of Stirling.*

Wales: *University College of Wales at Aberystwyth.*

Generally, the host universities offer a broad curriculum that includes most liberal arts majors. Life sciences and physical sciences are available.

**USSR.** Two semester programs are available, depending on language preparation. Students with two years of university-level Russian participate in a program developed for UC. Those with three years of university-level Russian may apply for a program organized by the Council on International Educational Exchange (CIEE), a consortium of American universities in which UC participates. Both programs are primarily intended for language majors, but are open to students of literature, history, area studies, etc.

*Leningrad State University.* Russian language and civilization only.

## Middle East

**Egypt.** All courses are taught in English, except courses in Arabic language and literature.

*The American University of Cairo.* A broad curriculum offered by the Faculty of Arts and Sciences. All students are required to take at least one year-long course in Arabic. Offerings in science are limited.

**Israel.** First priority is given to students who have completed at least one year of Hebrew. A compulsory language course precedes the beginning of the academic year. Study centers in Israel are administered by a UC faculty director located in Jerusalem.

*University of Haifa.* Humanities and social sciences, with special emphasis on contemporary Israel and Arab-Jewish studies. Limited opportunities in the sciences. Special program in Underwater Archaeology. Courses are taught in Hebrew. The Department of Study Programs for Overseas Students offers a core curriculum in Jewish, Middle East and Israeli studies, social sciences, and history of modern Israel taught in English.

*Hebrew University, Jerusalem.* Broad curriculum; emphasis on Israel and Middle Eastern studies. UC students enroll in a special program for foreign students, taught in English. The program offers courses in Judaic, Israeli, Middle Eastern studies, and a few courses in the general social sciences and humanities, science and business. Students with command of Hebrew have access to a broad curriculum throughout the Hebrew University.

## Asia

**Hong Kong.** A limited selection of courses is offered in English. Knowledge of Chinese is not required for acceptance; however, all students are required to complete at least two courses in Chinese culture, history, or language prior to departure. A compulsory intensive Cantonese program precedes the beginning of the academic year. All students are required to include 18 units of Mandarin or Cantonese in their annual program.

*Chinese University of Hong Kong.* Humanities and social sciences, with emphasis on Chinese studies. Art studio and music performance courses are available. (Information about courses to be offered in English is announced only one week before instruction begins.)

**India.** Instruction is in English. A compulsory intensive language program in conversational Hindi precedes the academic year. Students will take a year-long core program focusing on development in modern India and Indian culture and tradition, as well as continue their study of Hindi. During the second and third quarters, students will also take regular course work at the University of Delhi.

*University of Delhi.* Humanities and social sciences are well represented, with some offerings in fine arts and mathematics.

**Indonesia.** An eight-week summer intensive-language program at *Gadjah Mada University* in Yogyakarta is required for all students. Those with less than two years of University-level Indonesian must then take a ten-week inter-term program of continued study of the language, with additional courses in Indonesian history and culture, taught in English. Students enroll in regular courses at one of five institutions for the second semester. Instruction is in Indonesian; tutorial assistance may be available.

It is possible to apply for the summer intensive language program only. Students may take more advanced language in subsequent years.

*Gadjah Mada University.* Agriculture, anthropology, biology, economics, geography, mathematics, philosophy, psychology, political science.

*Institute Seni Indonesia (ISI).* The Indonesian Institute of the Arts: visual arts, music, dance, theater, fine arts, ethno-musicology.

*Akademi Seni Tari Indonesia (ASTI)* at Denpasar and Bandung. The Indonesian Dance Institute of Bali: dance, music, and theater.

*University of Padjadjaran* at Bandung. Development studies, environmental/ecology studies, humanities and social sciences are available.

**Japan.** Completion of one year of Japanese at the university level or the equivalent is required for acceptance. (A compulsory intensive language course precedes the academic year.) Students are expected to complete an additional 18 units of Japanese language during their year in Japan.

*Doshisha University, Kyoto.* Humanities and social sciences; emphasis on Japanese language and culture. This center serves students having more advanced study of Japanese; at least two, preferably three, years of UC Japanese language study.

*International Christian University, Mitaka (Tokyo).* Humanities and social sciences; emphasis on Japanese language and intercultural communication. A limited number of courses taught in English are available.

*Peace Studies Program, Meiji Gakuin University, Yokohama.* This spring quarter program provides students the opportunity to study world peace and security issues. Previous Japanese language study is preferred, but not required.

*Sophia University, Tokyo.* Comparative culture studies, Japanese language and literature, history, political science, economics and business are available. Many are taught in English.

*Tokyo Institute of Technology.* Graduate students proficient in Japanese may do research and take courses in science and engineering.

**People's Republic of China.** EAP offers a full-year program in Beijing and a fall semester program in Tianjin; a semester program in Nanjing is available through the Council on International Educational Exchange. Intensive language study in Chinese is the primary emphasis of all programs.

*Nanjing University.* This single-semester program combines intensive intermediate language instruction with courses in Chinese history and contemporary culture. The prerequisite is one year of college-level Chinese.

*Nankai University, Tianjin.* This fall semester program includes Chinese language study and courses taught in English on Chinese culture and civilization. The prerequisite is one year of college-level Chinese. Students must take an intensive language program in July and August prior to the start of the semester.

*Peking University.* A year-long program focused on advanced-level instruction in Chinese language and literature. Courses are conducted by the Chinese Language Teaching to Foreigners Division of Peking University. The prerequisite for the program is two years of college-level Chinese.

**Taiwan, Republic of China.** Students participating in the Chinese Language and Culture Studies program in Taipei receive instruction in the Chinese language and enroll in lecture courses (taught in English) on Chinese culture and society arranged by CSU International Programs. Courses in art history, literature, economics, history and political science are available. Prior course work in Chinese culture, history and language are recommended.

(This is a cooperative program with California State University International Programs).

**Thailand.** An eight-week summer intensive language program at *Chiangmai University* is required for all students. This is followed by a seven week inter-term program of continued study of the Thai language,

with additional courses in Thai history and culture, taught in English. Most students will remain at *Chiangmai University* for the second semester and continue taking courses in Thai language and area studies classes taught in English. Students with sufficient language background (more than two years of University-level Thai language) have the option of enrolling at *Chulalongkorn University* in Bangkok for the second semester. Instruction is in Thai, though English-speaking tutors are available.

It is possible to apply for the summer intensive-language program only. Students may take more advanced language courses in subsequent years.

## Africa

**Ghana.** *University of Ghana, Legon-Accra.* Open to undergraduate and graduate students. Instruction is in English. As in the British system, students take a year-long program of study in a single area. End-of-year examinations are given only once and are mandatory for credit to be awarded.

Offerings include humanities and social sciences, with emphasis on African studies. There is a strong program in ethnomusicology.

**Kenya.** Enrollment open to undergraduate and graduate students. As in the British system, students take a year-long program of study in their major or area of specialization. Examinations are given once, at the end of the academic year, and are mandatory for receiving credit. (Since operation of the Center is unpredictable, interested students should contact the EAP Office in South Hall for the latest status reports.)

*University of Nairobi.* Humanities and social sciences, with emphasis in African studies. Limited opportunities in the sciences and in veterinary science. Graduate students in history, political science, sociology, architecture, and design may associate with the Institute for Developmental Studies, Institute for African Studies, or the Housing and Research Development Unit.

**Togo.** *Study and field experience (SFE).* An eight-week summer program developed by UC. Four weeks of academic course work in French language and contemporary Africa are taught at the *University of Benin, Lomé*, followed by four weeks of field work.

## Latin America

**Brazil.** Language requirements for admission to this program are: two years of college-level Portuguese or the equivalent; or one year of college Spanish and one year of college Portuguese; or two years of college Spanish and completion of an intensive course in Portuguese *prior to departure*. Since courses are taught in Portuguese, the equivalent of one year of college-level Portuguese is the absolute minimum. A compulsory intensive language course precedes the beginning of regular course work.

*University of São Paulo.* Brazilian literature, Portuguese language, arts, humanities, social sciences. (This is a cooperative program administered by the Council on International Educational Exchange (CIEE).)

**Costa Rica.** *University of Costa Rica, San Jose.* As is appropriate in this Hemisphere, the academic year extends from early March through December. UC participants leave in January. Applications for participation in this program are due in May for a January departure.

A mandatory intensive language program precedes the academic year. During the academic year, courses in Central American studies (history, literature, political science, etc.) form half of the curriculum, with the remaining courses taken from any of the faculties at the University of Costa Rica.

*Costa Rica Tropical Biology Quarter at Monteverde.* This spring quarter program provides an unusual opportunity for undergraduates to study and do field research in a tropical cloud forest. Applicants should have completed a year of biology, including one upper-division organismal biology course, and have

some background in Spanish language.

*Costa Rica Medical Quarter at San Jose.* This winter quarter program provides medical students the opportunity to combine intensive medical Spanish instruction and clinical studies. Conversational ability in Spanish is required.

**Mexico.** *Universidad Nacional Autonoma de Mexico (UNAM), Mexico City.* A compulsory intensive language program precedes the beginning of the school year, augmented by courses in contemporary Mexico (history, art, literature, etc.). Students have the option of spending one semester (two UC quarters) at UNAM, or a full year.

*Study and Field Experience (SFE) in Mexico.* Available for either Fall or Spring Quarter, the SFE program begins in Mexico City with six weeks of intensive language courses and a course on contemporary Mexico. The final weeks of the program are spent doing volunteer work in a community outside of Mexico City to complement formal course work.

*Summer Intensive Language Quarter in Morelia.* This program provides total immersion in Mexican society and Spanish language instruction for students who have completed one year of University-level Spanish before departure. It is not appropriate for advanced students in Spanish.

**Peru.** A compulsory intensive language course precedes the beginning of the academic year. All courses are taught in Spanish.

*Universidad Católica, Lima.* Humanities, social sciences. Anthropology, archaeology, and ethno-history are of special interest. (This is a program of the Peru Consortium, which is composed of Indiana University and a number of California universities.)

## Canada

Students may enroll for a full year. Studies on the major or a closely allied field is expected.

*University of British Columbia (UBC), Vancouver.* Most academic disciplines are available. Areas of special interest include Pacific Rim and Canadian Studies.

## Australia and New Zealand

As is appropriate in the Southern Hemisphere, the academic year extends from the beginning of instruction in early March through the examination period, which starts in November. UC participants must leave in February, and will be unable to attend classes during the winter term preceding departure. Applications for participation in these programs are due in May for a February departure. The universities follow the British system of higher education.

The Australian program includes the *Australian National University* in Canberra; three institutions in the Melbourne area, *University of Melbourne, Monash University* and *La Trobe University*; the *University of Sydney*, and the *University of New South Wales* in Sydney; *University of Adelaide* and *Flinders University* in South Australia. A full range of academic programs is available. The Study Center accommodates a limited number of students. A UC faculty member in Melbourne directs all programs.

The New Zealand program includes the *University of Auckland, Lincoln College* in Christchurch, the *University of Otago* in Dunedin, *Massey University* in Palmerston North, and *Victoria University* in Wellington. All academic disciplines are available; programs in textiles and a variety of agricultural sciences are of special interest.

## Endocrinology (A Graduate Group)

Donald L. Curry, Ph.D., Chairperson of the Group  
Group Office, 4136 Medical Sciences-1A (Human  
Physiology, 752-3230)

**Graduate Study.** The interdepartmental Graduate Group in Endocrinology offers programs of study leading to the M.S. and Ph.D. degrees. The M.S. degree is offered under Plan I (thesis) of the master's program. Detailed information regarding graduate study is available through the Group Chairperson. See also the Graduate division section in this catalog.

**Graduate Advisers.** Contact the Program Office.

## Courses in Endocrinology

### Graduate Courses

#### 218. Mammalian Endocrinology and Homeostasis

(6) III. Turgeon, Walsh  
Lecture—5 hours; seminar—1.5 hours. Prerequisite: Physiological Sciences 101A-101B or Biochemistry and Biophysics 101A-101B and Physiological Sciences 110; consent of instructor. Physiological and biochemical properties of mammalian endocrine system both at the cellular and the systemic level. Biochemical principles that regulate homeostasis especially in organ-organ interrelationships of metabolites and minerals. Reproductive endocrinology. Seminar presentation of key current literature.

#### 220. Endocrinology Literature Critique (1) I, II.

Turgeon  
Discussion—1 hour. Prerequisite: consent of instructor. Critical reading and evaluation of current original publications in endocrinology. Selected papers will be presented and discussed in detail by faculty and students. May be repeated for credit. (S/U grading only.)

#### 235. Personal Computing in the Life Sciences (3)

I, II, III. Matthews  
Lecture—1 hour; laboratory—6 hours. Prerequisite: consent of instructor. Current and near-future uses of "state-of-the-art" personal computers and local area networks. Applications in the Life Sciences. Running programs on Macintosh IIx and 80386-based PC-compatible computers and on 3-Com local area network in Endocrinology Graduate Group Computer Laboratory.

#### 240. Biochemical Endocrinology (3) III. Adams (Animal Science)

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Examination of recent advances in biochemical endocrinology and molecular and cell biology of endocrine systems with emphasis on processes of hormone and receptor synthesis, second messenger phenomena, and hormonal control of gene expression.

#### 290. Seminar (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Prerequisite: consent of instructor. Discussion and critical evaluation of advanced topics and current trends in research in endocrinology. May be repeated for credit.

#### 298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor.

#### 299. Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)

(S/U grading only.)

## Engineering

(College of Engineering)

Mohammed S. Ghausi, Ph.D., Dean

John Killeen, Ph.D., Associate Dean—Graduate Studies and Research (Livermore)

Benjamin J. McCoy, Ph.D., Associate Dean—Research

Zuhair A. Munir, Ph.D., Associate Dean—Graduate Studies

James F. Shackelford, Ph.D., Associate Dean—Undergraduate Study

College Office, 2132 Bainer Hall (916-752-0553)

## Undergraduate Study

Fifteen undergraduate engineering curricula, including four formal double-major programs, are offered. Each of these is a four-year program leading to the degree of Bachelor of Science. The Agricultural, Chemical, Civil, Electrical, Mechanical Engineering, Aeronautical Science and Engineering, and Computer Science and Engineering curricula are seven programs which have been accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, the nationally recognized accrediting body for engineering curricula.

The four-year undergraduate program is divided into two parts: the **Lower Division Program** and the **Upper Division Program**.

## Graduate Study

See the Graduate Division section of this catalog. For additional information refer to the *College of Engineering Bulletin*, obtainable from the Dean's Office, or phone the Graduate Study Office at 916-752-0592.

## Lower Division Programs

If you enter the College of Engineering with **fewer than 84** quarter units of credit, follow one of the four Lower Division Programs shown below. The first program (I) is common to majors in Aeronautical Science and Engineering, Civil Engineering, Materials Science and Engineering, Mechanical Engineering, and combinations of these majors; (II) is for those majoring in Agricultural Engineering and the three Agricultural Engineering options: Aquacultural and Fisheries Engineering, Food Engineering, and Forest Engineering; the third (III) is for those majoring in Chemical Engineering and the double major, Chemical Engineering/Materials Science and Engineering; and the fourth (IV) is for those majoring in Computer Science and Engineering, Electrical Engineering and the double major Electrical Engineering/Materials Science and Engineering.

The lower division program for students who enter the College with 84 or more quarter units of credit is explained in the College of Engineering chapter, under "Admission to Advanced Standing."

### Lower Division Program I

*Requirements for Aeronautical Science and Engineering, Civil Engineering, Civil Engineering/Materials Science and Engineering, Mechanical Engineering, and Mechanical Engineering/Materials Science majors only.*

	UNITS	QUARTER USUALLY TAKEN
<b>Required Courses</b>		
Calculus—Mathematics 21A-21B-21C	12	1-2-3
Linear algebra—Mathematics 22A	3	6
Differential equations—Mathematics 22B	3	5
Vector analysis—Mathematics 22C	3	4
General physics—Physics 9A-9B-9C-9D*	16	3-4-5-6
General chemistry—Chemistry 1A-1B* or 4A-4B	10	2-3 or 4-5
Introduction to engineering systems—Engineering 3	3	1 or 2
(Engineering 3 is designed for freshman students. More advanced students may petition to substitute 3 units of technical electives for Engineering 3.)		
Engineering graphics in design—Engineering 4	3	1 or 2
Applications of computers—Engineering 5	3	2 or 3
Circuits, Engineering 17	3	5 or 6
Statics, Engineering 35	3	4 or 5
Properties of materials—Engineering 45	4	4 or 6

Expository writing—English 1 or 3, or Comparative Literature 1, 2 or 3-4	1 or 2	
Introduction to public speaking or group communication—Rhetoric and Communication 1 or 3	4	
Humanities-Social Sciences electives and /or General Education electives*	9	
Unrestricted electives*	7	
(*Students majoring in Civil Engineering or Civil Engineering/Material Sciences and Engineering are required to complete 12 units of physics including Physics 9A, 9B and 9C. In addition, either Physics 9D, Chemistry 1C, Biological Science 1A or Geology 50-50L is required. Further, 13 units of Humanities-Social Sciences electives and 3 units of Unrestricted electives are required in these two majors. Civil Engineering majors take Civil Engineering 10 in place of 3 units of unrestricted electives.)		
<b>Total Lower Division Units</b>	<b>90</b>	

### Lower Division Program II

*Requirements for major in Agricultural Engineering, and the three Agricultural Engineering options (Aquacultural and Fisheries Engineering, Food Engineering, and Forest Engineering) only.*

	UNITS	QUARTER USUALLY TAKEN
<b>Required Courses</b>		
Calculus, Mathematics 21A-21B-21C	12	1-2-3
Linear algebra, Mathematics 22A	3	6
Differential equations, Mathematics 22B	3	5
Vector analysis, Mathematics 22C	3	4
General physics, Physics 9A-9B-9C-9D	16	3-4-5-6
General chemistry, Chemistry 1A-1B	10	2-3
Organic chemistry, Chemistry 8A	3	6
Biological Sciences 1A, 1B, 1C	15	4-5-6
Engineering graphics in design, Engineering 4	3	1
Applications of computers, Engineering 5	3	2
Surveying, Civil Engineering 10 (Required for Forest Engineering option only)	3	3
Circuits, Engineering 17	3	5
Statics, Engineering 35	3	5
Properties of materials, Engineering 45	4	4
Expository writing, English 1	4	1
Introduction to public speaking or group communication, Rhetoric and Communication 1 or 3	4	2
Humanities-Social Sciences electives and General Education electives	8	1-3
<b>Total Lower Division Units</b>	<b>100</b>	

### Lower Division Program III

*Requirements for major in Chemical Engineering and the double major, Chemical Engineering/Materials Science and Engineering only.*

	UNITS	QUARTER USUALLY TAKEN
<b>Required Courses</b>		
Calculus—Mathematics 21A-21B-21C	12	1-2-3
Linear algebra—Mathematics 22A	3	6
Differential equations—Mathematics 22B	3	5
Vector analysis—Mathematics 22C	3	4
General physics—Physics 9A-9B-9C-9D*	16	3-4-5-6
General chemistry—Chemistry 1A-1B* or 4A-4B	10	2-3 or 4-5
Introduction to engineering systems—Engineering 3	3	1 or 2
(Engineering 3 is designed for freshman students. More advanced students may petition to substitute 3 units of technical electives for Engineering 3.)		
Engineering graphics in design—Engineering 4	3	1 or 2
Applications of computers—Engineering 5	3	2 or 3
Circuits—Engineering 17	3	5 or 6
Statics—Engineering 35	3	4 or 5
Properties of materials—Engineering 45	4	4 or 6
Vector analysis—		

Mathematics 22C	3	4
General Physics—Physics 9A-9B-9C	12	3-4-5
Physics 9D or Microbiology 102	4	6 or 7
General Chemistry—Chemistry 4A-4B-4C	15	1-2-3
Organic Chemistry—Chemistry 128A, 128B	6	4-5
Organic Chemistry laboratory—Chemistry 129A	2	4
Engineering applications of computers—Engineering 5	3	2 or 5
Circuits—Engineering 17	3	6
Statics—Engineering 35	3	5
Properties of materials—Engineering 45 (required only for Chemical Engineering/ Materials Science and Engineering majors)	4	4
Expository writing—English 1 or 3, or Comparative Literature 1, 2, or 3	4	2 or 3
Introduction to public speaking or group communication, Rhetoric and Communication 1 or 3	4	2 or 3
Humanities-Social Sciences electives and /or General Education electives	16	
<b>Total Lower Division Units</b>	<b>97</b>	

### Lower Division Program IV

*Requirements for majors in Electrical Engineering, Electrical Engineering/Materials Science and Engineering, and Computer Science and Engineering only.*

	UNITS	QUARTER USUALLY TAKEN
<b>Required Courses</b>		
Calculus, Mathematics 21A-21B-21C	12	1-2-3
Linear algebra, Mathematics 22A	3	6
Differential equations, Mathematics 22B	3	5
Vector analysis, Mathematics 22C	3	4
General physics, Physics 9A-9B-9C-9D	16	3-4-5-6
General Chemistry, Chemistry 1A-1B or 4A-4B	10	1-2 or 2-3
Introduction to engineering systems, Engineering 3	3	1 or 2
(Engineering 3 is designed for freshman students. More advanced students may petition to substitute 3 units of technical electives for Engineering 3)		
Engineering Computer Science 30	4-8	1 or 2
(Majors in Computer Science and Engineering are required to take Engineering Computer Science 40 (4 units) in addition to course 30. These majors may substitute courses 30H and 40H for courses 30 and 40.)		
Computer structure and assembly language, Engineering Electrical and Computer Science 70	4	3 or 4
Circuits, Engineering 17	3	6
Statics, Engineering 35	3	4 or 5
Properties of materials, Engineering 45	4	4 or 5
Expository writing, English 1 or 3 or Comparative Literature 1, 2, or 3	4	1 or 2
Introduction to public speaking or group communication, Rhetoric and Communication 1 or 3	4	5 or 6
Humanities-Social Sciences electives and /or General Education electives	12	
<b>Total Lower Division Units</b>	<b>88-92</b>	

## Upper Division Programs

If you have completed the requirements for the lower division program or have entered the College of Engineering with more than 84 quarter units of credit, you should follow the upper division requirements for the major you have selected from the programs that follow.

## Aeronautical Science and Engineering

Aeronautical Science and Engineering is the branch of engineering that applies scientific knowledge to the design, manufacture and operation of aircraft. The program leading to the Bachelor of Science degree in Aeronautical Science and Engineering is designed to provide 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 the student for immediate employment in government or industry, while simultaneously establishing an excellent foundation for graduate studies.

The fundamental disciplines of this branch of engineering apply to all bodies and vehicles whose applied loads are influenced by aerodynamic forces. Within this context, aeronautical engineers are involved with automobiles, trains, ships and submarines, aircraft, rockets and missiles, sports equipment, and a variety of energy systems.

However, aeronautical science and engineering usually limits its subject matter to atmospheric studies, as does the undergraduate curriculum at UCD. The fundamental engineering disciplines are supplemented with courses in aircraft propulsion, aerodynamics, aircraft performance, stability and control, aircraft preliminary design, and aeronautical structures.

A broad range of technical elective courses is available. Some students choose their electives from one area of study in order to begin developing a specialty. Others choose courses from several areas in order to broaden their background in the sciences and engineering. Typical aeronautical science and engineering specialties include aero-thermodynamics, propulsion systems, aircraft performance, stability and control, aeronautical structures, flight testing, or component and mechanism design. In any case, it is recommended that students consult with their adviser before selecting technical electives.

There are a number of electives which could be recommended to all aeronautical science and engineering students regardless of their chosen area of specialization. These include

Engineering 102L, 105L, 106, 118, 122, 190

Aeronautical Science and Engineering 131, 135, 137, 138B, 138L

Materials Science and Engineering 140, 142

Mechanical Engineering 150A, 150B, 150L, 162, 172, 184A, 184B, 186, 187

Electrical and Computer Science Engineering 150

Applied Science Engineering 115

Civil Engineering 131A

**Suggested advisers:** J.W. Baughn, J.J. Chattot, M. Hafez, R.A. Hess, J. Mantzaras, L.W. Rehfield, N. Sarigul-Klijn, C.P. van Dam, B.R. White.

## Aeronautical Science and Engineering

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.)

Minimum units required for major: 192.

UNITS

### Subject Areas and Courses

Electronic circuits—Engineering 100	4
Applied mechanics—Engineering 102A, 102B, 104A, 104B, 104L	13
Applied thermodynamics—Engineering 105A, 105B, Mechanical Engineering 165	10
Fluid mechanics—Engineering 103A, 103B,	

103L.....	7
Aeronautical engineering fundamentals—Aeronautical Science and Engineering 125	3
Aerodynamics—Aeronautical Science and Engineering 126, 127	8
Aircraft propulsion, performance, stability and control—Aeronautical Science and Engineering 128, 129, 138A	12
Aircraft preliminary design—Aeronautical Science and Engineering 130	4
Aeronautical structures—Civil Engineering 131B, Aeronautical Science and Engineering 135	6
Measurement systems—Mechanical Engineering 176	3
Controls and system analysis—Mechanical Engineering 171	4
Applied mathematics—Engineering 180	3
Technical electives	10
Students are urged to consider choosing from Engineering 102L, 105L, 106, 118, 122, 190, Aeronautical Science and Engineering 131, 137, 138B, Materials Science and Engineering 140, 142, Mechanical Engineering 150A, 150B, 150L, 162, 172, 184A-184B, 186, 187, Electrical and Computer Science Engineering 150, Applied Science Engineering 115, Civil Engineering 131A.	
Humanities-Social Sciences electives and / or General Education electives	15

**Total Units for Upper Division Program.....102**

## Agricultural Engineering

Combine a broad general training in engineering with a basic understanding of biological phenomena and you have the preparation for a challenging and socially useful career.

Agricultural engineers create systems, equipment, and processes for the production and utilization of biological materials. They integrate a cross section of engineering disciplines, with special attention to the interface between physical systems and biological products. Agriculture (including nursery and greenhouse enterprises), food processing and manufacturing, timber production and forest management, and aquaculture are among the many areas agricultural engineers are prepared to serve. Each area is involved with producing, handling, packaging, storing and transporting biological materials. The practice of agricultural engineering requires an understanding of the unique properties of these materials and the knowledge to control their environment, thereby creating optimal conditions for biological activity.

Agricultural engineers often work in interdisciplinary teams with biological scientists and other engineering specialists. The growth of biotechnology, environmental issues, and concern for the interface of human beings with engineering systems have created new and exciting opportunities. Agricultural engineers are needed to provide engineering solutions for taking the advances in the biological sciences out of the laboratory and into the real world.

The program allows students to select one of four curricula, depending on their specific interests, while it retains the versatility to adapt to careers in several areas. All curricula share a common lower division program and a common core of courses in the upper division. The first upper division curriculum (1) provides a general program in Agricultural Engineering, with the opportunity to focus on a particular area of interest. The remaining curricula provide options for (2) Aquacultural Engineering, (3) Food Engineering, and (4) Forest Engineering.

## Agricultural Engineering

### Curriculum 1

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.)

Agricultural Engineers are concerned with the production, processing, packaging, and use of biological materials. This program requires the integration

of engineering with a spectrum of biological disciplines and creates the opportunity for many areas of specialization, depending on student interest.

For example, irrigation and drainage specialists apply engineering principles in the design and operation of water systems for biological production. Structures and environment specialists design structures to provide optimum environments for plant production in greenhouses, product storage and conditioning, and animal production. Power and machinery specialists design, develop, and apply machinery and energy systems for crop production and processing. Electronics and electrical systems specialists develop sensors, instrumentation, and control systems for monitoring and controlling production environments and post-harvest processes.

The senior year design project provides students with an opportunity to focus on an area of special interest. Additional courses in this area can be selected with the help of an adviser.

### Upper Division Requirements

Minimum units required for major: 196.

UNITS

### Subject Areas and Courses

Electronic circuits and microcomputers—Engineering 100 and Agricultural Engineering 165	8
Applied mechanics and thermodynamics—Engineering 102A, 102B, 103A, 104A, 104B, and 105A	18
Engineering economics—Engineering 106	3
Mathematics—Applied Science Engineering 115 or Engineering 180	3
Statistics—Civil Engineering 114	3
Agricultural engineering—Agricultural Engineering 114, 125, 132 and 145	14
Engineering design	11
(a) Agricultural Engineering 170A, 170B, and 170C.	
(b) Select one course from Civil Engineering 132A, 145, Mechanical Engineering 150A.	
Professional responsibilities—Engineering 190	3
Humanities—Social Sciences electives and/or General Education electives	16
Biological and agricultural sciences	9
Select from Agronomy 100, Animal Science 2, Biochemistry and Biophysics 101A, Botany 111, 112, Chemistry 8B, Entomology 110, Environmental Horticulture 133, Nutrition 115, Physiology 110, 149, Plant Pathology 120, Plant Science 2, 112, 112L, Soil Science 100, 107, 109, Vegetable Crops 101, Water Science 110.	
Required technical courses	11
Agricultural Engineering 112, Civil Engineering 141, 141L, Engineering 111.	

**Total Units for Upper Division Program.....99**

## Aquacultural and Fisheries Engineering Curriculum 2

Aquacultural and fisheries engineers are involved in the design, fabrication, and management of equipment and facilities for culturing, harvesting, and handling aquatic plants and animals. Maintenance of proper habitat and environmental conditions, both in controlled aquaculture operations and in natural fishery settings, is a primary consideration.

### Upper Division Requirements

Minimum units required for major: 202.

UNITS

### Subject Areas and Courses

Electronic circuits and microcomputers—Engineering 100 and Agricultural Engineering 165	8
Applied mechanics and thermodynamics—Engineering 102A, 102B, 103A, 104A, 104B, and 105A	18
Engineering economics—Engineering 106	3

Mathematics—Applied Science Engineering 115 or Engineering 180.....	3
Statistics—Civil Engineering 114 .....	3
Agricultural Engineering.....	10
Select three courses from Agricultural Engineering 114, 125, 132, and 145.	
Engineering design .....	11
(a) Agricultural Engineering 170A, 170B and 170C.	
(b) Select one course from Civil Engineering 132A, 145, Mechanical Engineering 150A.	
Professional responsibilities—Engineering 190.....	3
Humanities—Social Sciences electives and/or General Education electives .....	16
Biological and agricultural sciences .....	15
Select from Animal Science 118, Environmental Studies 150A, 151, Wildlife and Fisheries Biology 102, 120, 121, and 122.	
Technical electives .....	15
Ten units must be selected from Agricultural Engineering Technology 161A, 161B, Agricultural Engineering 112, Civil Engineering 141, 141L, 148A, 148B, Engineering 103B, 111.	
<b>Total Units for Upper Division Program.....</b>	<b>105</b>

## Food Engineering

### Curriculum 3

Food engineering is the application of engineering principles and concepts to the handling, storage, processing, packaging, and distribution of food for human consumption. Food engineers play a key role in assisting the food industry to meet the ever-increasing demands for high-quality foods. The food engineering option is intended to provide a student with an understanding of engineering principles, as well as knowledge of chemical, microbiological, and biochemical characteristics of foods. Concepts of food storage, refrigeration, drying, freezing, and food manufacturing are studied. Summer internships in the California food industry are usually available and students are encouraged to make use of these opportunities.

#### Upper Division Requirements

Minimum units required for major: 201.

### UNITS

#### Subject Areas and Courses

Electronic circuits and microcomputers—Engineering 100 and Agricultural Engineering 165.....	8
Applied mechanics and thermodynamics—Engineering 102A, 102B, 103A, 104A, 104B, and 105A .....	18
Engineering economics—Engineering 106 .....	3
Mathematics—Applied Science Engineering 115 or Engineering 180.....	3
Statistics—Civil Engineering 114 .....	3
Agricultural Engineering.....	10
Agricultural Engineering 132, plus two courses from Agricultural Engineering 114, 125, and 145.	
Engineering Design .....	11
(a) Agricultural Engineering 170A, 170B and 170C.	
(b) Select one course from Civil Engineering 132A, 145, Mechanical Engineering 150A.	
Professional responsibilities—Engineering 190.....	3
Humanities—Social Sciences electives and/or General Education electives .....	16
Biological and agricultural sciences .....	16
Biochemistry and Biophysics 101A, Chemistry 8B, Food Science and Technology 104, 111, 150 or 151.	
Required technical courses .....	13
Engineering 103B, 105B, 111, Mechanical Engineering 165.	
<b>Total Units for Upper Division Program.....</b>	<b>104</b>

## Forest Engineering

### Curriculum 4

Forest Engineering is the application of engineering principles and silvicultural knowledge in the management of forests and forest land. Ecological, aesthetic, and recreational aspects of this renewable natural resource are integrated into systems for the production of wood products. Students study systems and equipment for timber harvesting, forest residue management, reforestation, forest recreational facilities, soil and water control and conservation, forest road development, materials handling, and other phases of forestry. This option is administered in cooperation with the Department of Forestry and Resource Management at UC Berkeley. Fall quarter of the junior year is spent on the Berkeley campus, following an eight-week summer field course sequence at the UC Forestry Camp near Quincy.

Students who transfer to the University from another institution to enter this program should apply for admission to the Davis campus even if they plan to attend the Berkeley campus before coming to Davis. These students, as well as those attending the Davis campus before going to Berkeley, obtain Intercampus Visitor status that authorizes them to register on the Berkeley campus for the semester to be spent on that campus. Application forms for Intercampus Visitor status are available from the Department of Agricultural Engineering.

#### Upper Division Requirements

Minimum units required for major: 212.5.

### UNITS

#### Subject Areas and Courses

Electronic circuits and microcomputers—Engineering 100 and Agricultural Engineering 165.....	8
Applied mechanics and thermodynamics—Engineering 102A, 102B, 103A, 104A, 104B, and 105A .....	18
Engineering economics—Engineering 106 .....	3
Mathematics—Applied Science Engineering 115 or Engineering 180.....	3
Statistics—Civil Engineering 114 .....	3
Agricultural Engineering.....	10
Select three courses from Agricultural Engineering 114, 125, 132, and 145.	
Engineering design .....	11
(a) Agricultural Engineering 170A, 170B and 170C.	
(b) Select one course from Civil Engineering 132A, 145, Mechanical Engineering 150A.	
Professional responsibilities—Engineering 190.....	3
Humanities—Social Sciences electives and/or General Education electives .....	16
Summer camp .....	15
Forestry 100A, 100B, 100C, 100D.†	
Biological and agricultural sciences .....	9
Forestry 125.† Select three units from: Forestry 101, 110, 113, 120 (or Soil Science 100), Forest Products 132.†	
Required technical courses .....	13.5
Agricultural Engineering 115, 116, Forestry 102, (or Geography 106), 103.†	
<b>Total Units for Upper Division Program.....</b>	<b>112.5</b>

†Forestry and forest products courses offered only by Berkeley campus.

## Chemical Engineering

Chemical Engineering is concerned with the application of the principles of chemistry and engineering to the creation of useful products. The products of the process industries range from antibiotics to zirconium, from integrated circuits to integrated management of wastes, from food and agricultural chemicals to synthetic polymers. Chemical engineers are increasingly concerned with chemical and engineering processes related to the environment, food and pharmaceutical production, and medicine. Prepara-

tion for careers 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 the student may achieve competence in treating not only current technical problems but also those that will arise in the technologies of the future. In the junior year, attention is focused on basic engineering courses, particularly thermodynamics, fluid mechanics, and energy transfer. In the senior year these fundamentals are drawn together and applied in a study of mass transfer phenomena, process design, and process dynamics and control. The program is strengthened and broadened with introductory courses in the electrical and mechanical sciences.

The curriculum includes 12 units of technical electives and 6 units of advanced chemistry electives which allow the student to strengthen specific areas in Chemical Engineering, to explore new areas, or to pursue areas of specialization. The most popular areas of specialization, together with lists of **suggested** technical electives, are identified and discussed in the following paragraphs. Please talk to the instructors of the courses listed about possible prerequisites before enrolling.

The *premedical* and *prebiomedical engineering* areas of specialization have been specifically designed to prepare the student for graduate work in biomedical engineering or to meet the undergraduate requirements for entrance into medical school. Because of the emphasis on the natural sciences and the application of fluid mechanics, mass transport, heat transfer, thermodynamics, reaction kinetics, and process dynamics to problems in natural science, students are well-prepared to understand problems in living systems. Many biological phenomena, such as blood flow, solute transport, and energy exchange, can be dealt with using the theoretical tools learned as an undergraduate.

### AREAS OF SPECIALIZATION:

**Applied Chemistry.** The Chemical Engineering curriculum includes an important core of chemistry courses. Students can take advantage of this background to build a strong program in chemistry by choosing electives from among advanced undergraduate chemistry courses.

Suggested technical electives:

Chemistry 111, 115, 121, 126, 128C, 129B, 129C, 130, 131, 150

Textiles and Clothing 100, 110

**Applied Mathematics.** The mathematics specialization is designed both to strengthen the student's understanding of the foundations of engineering science and to improve the ability to treat complex engineering problems. Courses in abstract algebra, advanced calculus, and the theory of differential equations provide a sound theoretical background, while courses in analytical and numerical analysis provide the techniques for solving a wide range of engineering problems.

Suggested technical electives:

Applied Science Engineering 115, 116

Mathematics 118A, 118B, 119, 121A, 121B, 128A, 128B, 128C, 131, 132A, 132B, 160, 164, 185A, 185B

**Biochemical Engineering.** This area of specialization prepares students to do graduate work in biochemical engineering and for employment in the biotechnology, pharmaceutical, and food industries.

Suggested technical electives:

*Strongly recommended*

Microbiology 102 (instead of Physics 9D), 102L, 130A, 130B, and 130L

Biochemistry and Biophysics 101A, 101B

Chemical Engineering 161

*Recommended*

Genetics 100, 102A, 102B, 102L

Biochemistry and Biophysics 101L, 123, 123L, 133

**Computers and Automation.** This specialization offers the opportunity to master various computational techniques to formulate, solve, and analyze chemical engineering problems. In addition, the student is exposed to the theory and practice of monitoring and operation of chemical processes using microprocessor based control systems. The common ingredient in all these studies is the use of computers. Development of expert systems for detecting process failures, using computer-aided design (CAD) packages to optimize product yields, solving large numbers of equations on supercomputers to assess transient behavior of processes, and implementation of plantwide control systems are all examples of chemical engineering endeavors based on extensive use of computers. The following list of elective courses is suggested to help the student obtain the necessary background in respective areas.

Suggested technical electives:

Artificial Intelligence and Computer Graphics:

Computer Science Engineering 170, 175

Numerical Analysis and Optimization:

Applied Science Engineering 115, 116

Mathematics 128B-C, 132A-B, 168

Civil Engineering 153

Automatic Control:

Electrical and Computer Science

Engineering 150, 151, 157B

Mechanical Engineering 176

Food Science and Technology 156

**Electronics Processing.** Because the manufacture of semiconductor devices, integrated circuits, and magnetic memories, tapes, and disks involves the application of chemical and engineering principles, chemical engineers are finding productive careers in the electronics industry. The electronics processing specialization introduces the student to the analysis and design of modern circuits and devices and provides a strong background in the layout and fabrication of such devices.

Suggested technical electives:

Computer Science Engineering 140

Chemical Engineering 163

Electrical and Computer Science Engineering 115A-

115B, 145A, 145B, 145C

Physics 140A, 140B

**Energy Engineering.** This area of specialization is designed to introduce the student to the various energy sources and energy conversion methods.

Suggested technical electives:

Agricultural Engineering 112

Engineering 111, 160, 162

Mechanical Engineering 162, 163

Resource Sciences 103

**Environmental Engineering.** The environmental engineering option prepares the student to deal with problems of environmental quality by developing knowledge of fundamental chemical and transport phenomena: chemical reaction processes coupled with fluid mechanics, heat transfer, and mass transfer. Such a foundation in basic chemical engineering science, plus the usual chemical engineering analysis and design courses and courses on environmental topics, prepares the student to seek employment with industry or government. For this specialization six courses should be selected from the following list:

Suggested technical electives:

**Air Environment**

*Strongly recommended*

Civil Engineering 149A

*Recommended*

Atmospheric Science 121A, 121B, 158

Civil Engineering 242A, 242B, 244

Environmental Studies 110

Environmental Toxicology 101, 112A,

112B, 131

**Water Environment**

*Strongly recommended*

Chemical Engineering 161

Civil Engineering 148A, 148B	58
Microbiology 102 (instead of Physics 9D)	9
<i>Recommended</i>	
Biochemistry and Biophysics 101A, 101B	
Civil Engineering 147, 240, 243A, 243B, 244, 245, 246A, 246B	
Environmental Studies 110, 151	
Environmental Toxicology 101, 112A, 112B	
Water Science 41	

**Food Process Engineering.** This area of specialization prepares students to do graduate work in food science and technology and to work in the food processing industry.

Suggested technical electives:

*Strongly recommended*

Microbiology 102 (instead of Physics 9D)

Biochemistry and Biophysics 101A, 101B

Chemical Engineering 161

Agricultural Engineering 132

Food Science and Technology 104, 104L, 111

*Recommended*

Food Science and Technology 150, 150L, 151

**Marketing.** Specialty chemical and product manufacturers need chemical engineers who have training in market management, which involves the application of economics, psychology, and statistics in market planning and forecasting and in strategically developing and promoting new products.

Suggested technical electives:

Management 250, 251

Agricultural Economics 113, 130, 136

Psychology 183

Statistics 103, and 32 or 102

**Prebiomedical Engineering.** This area of specialization is designed to prepare the student for graduate work in biomedical engineering. Early planning of a complete course schedule in consultation with a Chemical Engineering adviser is important to provide space for Biological Sciences courses.

Suggested technical electives:

Four to six courses from

Anatomy 100, Biochemistry and Biophysics 101A, 101B, Biological Sciences 1A, 1B, 1C, 10, Physiological Sciences 101A, 101B, Physiology 110, 111A, 111B, 112, 113, 114.

**Premedical.** Inclusion of both organic and physical chemistry in the curriculum allows the student to complete the premedical requirements while satisfying the requirements of the Chemical Engineering major. Those electing the premedical (including pre-veterinary) area of specialization should verify the specific preparation requirements with the Health Sciences Advising Office before making a final decision on electives. To insure that room is provided in the program for the biology courses, it is important to prepare a course schedule with a Chemical Engineering adviser early in the freshman year.

Suggested technical electives:

Anatomy 100

Chemistry 128C, 129B, 129C

Six biology or biochemistry courses, such as Biochemistry and Biophysics 101A, 101B, Biological Sciences 1A, 1B, 1C, Genetics 100, Microbiology 102, Physiology 110, 112, 113, 114, Zoology 100.

### Chemical Engineering

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 193.

UNITS

### Subject Areas and Courses

Engineering—Engineering 100, 106 .....

Chemical Engineering—Chemical Engineering 150A, 150B, 151, 152A, 152B, 153, 154A, 154B, 155A, 155B, 156A, 156B, 157, 158,

159, 160.....	58
Chemistry—Chemistry 110A, 110B, 110C.....	9
Advanced chemistry electives .....	6
To be selected from upper division courses in Chemistry and Biochemistry and Biophysics, Chemical Engineering 161, 163, Civil Engineering 148A, 149A, Engineering 134, 144, 147, Environmental Toxicology 112A-112B, Food Science and Technology 100A-100B, 101A-101B, 104, 111, 119, Physiological Sciences 101A-101B.	
Technical electives .....	12
Humanities-Social Sciences/General Education electives .....	8

**Total Units for Upper Division Program.....100**

### Chemical Engineering/Materials Science and Engineering

Minimum units required for major: 200.

UNITS

### Subject Areas and Courses

Engineering—Engineering 100, 106 .....

Chemical engineering—Chemical Engineering 150A, 150B, 151, 152A, 152B, 153, 154A, 154B, 155A, 155B, 156A, 156B, 157, 158, 159, 160.....58

Chemistry—Chemistry 110A, 110B, 110C.....9

Materials science—Materials Science Engineering 130, 132, 134, 138, and two courses chosen from Materials Science Engineering 140, 142, 144, 147, and three laboratory courses chosen from 132L, 134L, 138L, 140L, 142L, and 144L.....21

Humanities-Social Sciences electives and/or General Education electives .....

**Total Units for Upper Division Program.....103**

### Civil Engineering

Civil engineering is devoted to the improvement of the human environment for the purposes of making our activities productive, safe, and enjoyable, and to providing aesthetically pleasing surroundings. The profession contributes directly to humanity's continued health and well-being by the planning and design of systems that provide plentiful supplies of potable water; freedom from disease-carrying wastes; land-, water-, and air-transportation; housing and other structures; flood control; and large recreational facilities.

Areas of specialization within civil engineering include (1) Civil Engineering Planning; (2) Environmental Engineering; (3) Structural Engineering, Structural Mechanics and Geotechnical Engineering; (4) Transportation Planning and Engineering; and (5) Water Resources Engineering. You may specialize in one or more of these areas by selecting appropriate technical electives; however, such specialization is not required. While developing your individual program, you are urged to consult a faculty adviser.

Because of the direct concern of professional civil engineers for the quality of human life, civil engineering students are encouraged to include among their technical electives courses such as Economics 125A and 125B, Environmental Studies 160 and 166, Political Science 108, 109, and Sociology 143A or 143B. Additional information concerning the areas of specialization and suggested courses are given in the following paragraphs.

### AREAS OF SPECIALIZATION:

**Civil Engineering Planning.** Specialization in this area is directed toward planning of resources utilization and development of projects on an urban or regional scale. Civil engineering planning requires an understanding of the basic principles of engineering, economics, law, planning concepts and techniques, environmental sciences, public administration, and politics. You are encouraged to plan your program early with the aid of a faculty adviser and to complement the suggested technical electives with courses in the humanities and social sciences.

## Suggested technical electives:

- Agricultural Economics 147, 148, 176  
 Civil Engineering 137, 146, 152, 153, 160, 161, 162  
 Economics 125A, 125B, 130, 131  
 Engineering 160  
 Environmental Studies 160, 161, 165, 167, 168A, 168B, 169, 171, 173, 179  
 Geography 155, 162  
 Geology 134  
 Political Science 100, 101, 102, 107, 108  
 Water Science 150, 154

Suggested advisers: R. Kitamura, J.R. Lund, P. Mokhtarian, D. Sperling.

**Environmental Engineering.** Specialization in this area is concerned with improving and maintaining the qualities of the air, land, and water environments that affect our health and well-being in the face of increasing population and expanding industrial activity. The program is based on a firm basic science and civil engineering foundation and emphasizes the design of waterborne, solid, and airborne waste management systems; the design of potable water-supply systems; and environment monitoring.

## Suggested technical electives:

- Atmospheric Science 120, 121A, 121B, 158  
 Microbiology 102, 105, 130A  
 Biochemistry and Biophysics 101A, 101B  
 Chemical Engineering 154A, 154B, 156A, 156B  
 Chemistry 107A, 107B, 110A, 128A, 128B  
 Civil Engineering 140, 140L, 142L, 145, 146, 147, 148B, 149, 152  
 Engineering 180  
 Environmental Studies 150A, 150B, 150C, 151, 166  
 Mathematics 128A, 128B, 128C  
 Statistics 130A, 130B

Suggested advisers: D.P.Y. Chang, J. Darby, G.T. Orlob, O.G. Raabe, E.D. Schroeder, G. Tchobanoglou.

**Structural Engineering, Structural Mechanics, and Geotechnical Engineering.** This area is concerned with conception, design, analysis, economics, and construction of structures such as buildings, bridges, highways, and dams. Structural Engineering encompasses structures made from materials such as metals, reinforced concrete or timber. Geotechnical Engineering encompasses natural and man-made types of structure such as foundations or slopes which are composed of rock or soil. Structural mechanics emphasizes more theoretical aspects of structures—such as mathematical analysis and characterization of material properties.

## Suggested technical electives:

- Art 121A  
 Civil Engineering 131B, 132A, 132C, 133, 134, 137, 138, 139, 162, 173, 177  
 Engineering 122, 138, 180  
 Mathematics 128A, 128B, 128C

Suggested advisers: K. Arulanandan, J.A. Cheney, Y.F. Dafalias, L.R. Herrmann, J.R. Hutchinson, I.M. Idriss, B. Kutter, K.D. Mish, M.R. Ramey, K.M. Romstad, C.K. Shen, M.A. Taylor.

**Transportation Planning and Engineering.** Specialization in this area is concerned with the development, coordination, and management of transportation systems for the movement of people and goods in a manner compatible with societal demands. Transportation planning blends knowledge of the basic concepts of engineering, economics, and planning in the development of policies, programs, and projects. Transportation systems engineering blends knowledge of many engineering disciplines in the design, construction, operation, and maintenance of transportation facilities in the form of an integral system. Students should acquire an awareness of the social sciences and environmental sciences through courses in these areas.

## Suggested technical electives:

- Civil Engineering 137, 149, 152, 153, 160, 161, 162  
 Engineering 118, 160  
 Environmental Studies 167, 168A, 168B, 171, 173, 178, 179

Suggested advisers: P. Jovanis, R. Kitamura, P. Mokhtarian, D. Sperling.

**Water Resources Engineering.** This area includes hydrology, hydraulics, and water resources systems planning and design. Hydraulics is concerned with flow in pipe and open-channel water-distribution systems and through hydraulic structures. Water resources system planning and design is concerned with the comprehensive development of water resources for multiple use. Emphasis is placed on principles of planning, analysis, and engineering design and operation as related to the water needs of industry, agriculture, recreation, and other activities.

## Suggested technical electives:

- Agricultural Economics 148, 176  
 Atmospheric Science 120, 121A, 121B  
 Civil Engineering 142L, 144, 145, 146, 148B, 152, 153  
 Electrical and Computer Science Engineering 112, 151  
 Environmental Studies 128, 150A, 151  
 Geography 162  
 Water Science 103, 110, 111, 150, 160

Suggested advisers: M.L. Kavvas, I. King, B.E. Larock, J.R. Lund, M.A. Mariño, G.T. Orlob.

**Civil Engineering**

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 180.

UNITS

**Subject Areas and Courses**

- Electronic circuits—Engineering 100 or 111 ..... 3+  
 Applied mechanics—Engineering 102A, 103A, 104A, 104L ..... 10  
 Applied thermodynamics—Engineering 105A or Chemistry 110A ..... 3  
 Structures—Engineering 104B; Civil Engineering 131A ..... 6  
 Soil mechanics—Civil Engineering 171, 172+ ..... 5  
 Hydraulics and water resources—Civil Engineering 141, 141L, 142 ..... 7  
 Environmental—Civil Engineering 148A ..... 3  
 Civil engineering design—Civil Engineering 132B; plus any five courses from Civil Engineering 132A, 132C, 134, 139, 145, 147, 148B, 152, 162, 173 (must include one from courses 134, 145, 148B, 162, or 173) ..... 18  
 Economics—Engineering 106 ..... 3

Engineering mathematical analysis—Applied Science Engineering 115; Civil Engineering 114, and either Applied Science Engineering 116, Civil Engineering 131B or 153 ..... 9

Transportation electives—select from Civil Engineering 160, 161, or 162 ..... 3  
 Technical electives ..... 9+  
 Six of these units must be selected from engineering courses.

Humanities-Social Sciences electives and/or General Education electives ..... 11

**Total Units for Upper Division Program.....90-91**

**Civil Engineering/Materials Science and Engineering**

Minimum units required for major: 184.

UNITS

**Subject Areas and Courses**

- Electronic circuits—Engineering 100 ..... 4  
 Applied mechanics—Engineering 102A, 103A, 104A, 104L ..... 10  
 Applied thermodynamics—Engineering 105A or Chemistry 110A; Materials Science Engineering 130 ..... 6  
 Structures—Engineering 104B; Civil Engineering 131A ..... 6

<sup>†</sup>One unit of Engineering 100 applies toward the Technical electives requirement.

<sup>‡</sup>Civil Engineering 10 is a required prerequisite to Civil Engineering 172. The extent of further specialization is chosen by the student with the help of departmental advisers.

Soil mechanics—Civil Engineering 171, 172+ ..... 5

Hydraulics and water resources—Civil Engineering 141, 141L, 142 ..... 7

Environmental—Civil Engineering 148A ..... 3

Civil engineering design—Civil Engineering 132B, plus any three courses from Civil Engineering 132A, 132C, 134, 139, 145, 147, 148B, 152, 162, 173 (must include one from Civil Engineering 134, 145, 148B, 162 or 173) ..... 12

Economics—Engineering 106 ..... 3

Engineering mathematical analysis—Applied Science Engineering 115; Civil Engineering 114, and either Applied Science Engineering 116 or Civil Engineering 131B or 153 ..... 9

Materials science—Materials Science Engineering 132, 132L, 134, 134L, 138, 138L, and two courses from Materials Science Engineering 140, 142, 144, 147 or Civil Engineering 133 ..... 18

Humanities-Social Sciences electives and/or General Education electives ..... 11

(Civil Engineering 137 recommended.)

**Total Units for Upper Division Program.....94**

**Electrical Engineering and Computer Science**

(See also Computer Science)

The Department of Electrical Engineering and Computer Science administers three undergraduate curricula: Electrical Engineering, Computer Science and Engineering, and Electrical Engineering/Materials Science and Engineering. The Department, through the Division of Computer Science, also administers a Computer Science curriculum in the College of Letters and Science which is described in detail under the listing "Computer Science" in this catalog.

The upper division requirements for the degrees in Electrical Engineering, Computer Science and Engineering, and Electrical Engineering/Materials Science and Engineering are described below. Lower division requirements are listed under Lower Division Curricula at the beginning of the Engineering section. Please note that the lower division requirements for these majors differ from those of other Engineering curricula and are found in "Lower Division Program IV."

**Electrical Engineering**

Electrical Engineering involves the design, analysis, and effective use of electrical systems. Electrical systems play central roles in nearly all aspects of modern life, including home entertainment, space exploration, medicine, communications, transportation, energy, industrial automation, defense, commerce, and education.

The Electrical Engineering curriculum combines a strong background in the scientific and theoretical aspects of electrical engineering with a practical knowledge of the design of electrical systems to prepare students both for careers in industry and graduate study.

**AREAS OF SPECIALIZATION:**

The Electrical Engineering curriculum is designed to provide you with a solid background in mathematics and physical science preparatory to a study of fundamental electrical engineering principles, including electromagnetics, physical electronics, and electronic circuits. Through the choice of upper division technical electives, you are then able to concentrate your studies in one of the many specialized fields of electrical engineering. Examples of some of the possible fields of specialization are circuits and electronics, signal processing, computer engineering, controls, automation, solid-state electronics, communication, microwaves, and electro-optics. You should select the elective courses leading to a specialty in consultation with a faculty adviser.

## Electrical Engineering/Materials Science and Engineering

In addition to the general Electrical Engineering curriculum, the Department of Electrical Engineering and Computer Science offers a double major in Electrical Engineering/Materials Science and Engineering. In the past decade, the fields of solid-state electronics, opto-electronics, magnetics, and superconductors have developed to the point that demands for new materials now pace progress in these fields. Materials scientists with an electronics background are key to continued progress in these areas. The Electrical Engineering/Materials Science and Engineering curriculum is designed to provide such a background.

## Computer Science and Engineering

Computer Science and Engineering encompasses the organization, design, development, analysis, theory, programming, and application of digital computers. It spans the hardware-software spectrum and, thus, combines many aspects of computer science and computer engineering.

The Computer Science and Engineering curriculum has been designed to meet the demand for graduates knowledgeable in all major aspects of digital computers. As a consequence, it is broader than either computer engineering or computer science. Compared with computer engineering (i.e., the Electrical Engineering degree with a specialization in computer design), it is distinguished by the additional study of software systems and computational theory. Compared with computer science, it is distinguished by the inclusion of many engineering and design-oriented courses.

Through the selection of upper division technical electives, students are able to emphasize either hardware or software design within the Computer Science and Engineering curriculum.

## Electrical Engineering

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 180.

### UNITS

#### Subject Areas and Courses

Circuits, systems and electronics—Engineering 100, Electrical and Computer Science Engineering 110A, 110B, 111A, 111B, 112 ...16	UNITS
Electromagnetic fields and physical electronics—Electrical and Computer Science Engineering 130A, 130B, 140A .....9	
Electrical Engineering breadth requirements — select nine units from Electrical and Computer Science Engineering 131A, 145A, 151, 157A, 160, 171 .....9	
Professional responsibilities—Engineering 190 .....3	
Engineering science—Engineering 102A, 105A .....6	
Probability Theory—Statistics 120, 131A or Mathematics 131 .....4	
Design electives—select six courses (at least two courses with a laboratory) from Electrical and Computer Science Engineering 114, 118, 132A, 132B, 146A, 146B, 150, 152, 157B, 161, 172, 175, 176, 177, 182A, 182B, Computer Science Engineering 110, 140, 142, 150, 160, 165, 168, 175 (may include approved 192 or 199 course) .....18	
Additional technical electives .....15	
Humanities-Social Sciences electives and/or General Education electives .....12	

**Total Units for Upper Division Program.....92**

## Computer Science and Engineering

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology, Inc.)

Minimum units required for major: 186.

### UNITS

#### Subject Areas and Courses

Circuits, systems, and electronics—Engineering 100, Electrical and Computer Science Engineering 110A, 110B, 111A, 111B, 112 ...16	UNITS
Electromagnetic fields and physical electronics—Electrical and Computer Science Engineering 139, 140A .....7	
Engineering science—Engineering 102A, 105A .....6	
Discrete structures and probability—Computer Science Engineering 100, plus one course from Statistics 120, 131A, or Mathematics 131 .....7	
Computer hardware—Electrical and Computer Science Engineering 171, 176 .....8	
Computer science theory—Computer Science Engineering 110, plus Computer Science Engineering 120 or 122 .....7	
Those planning to take Computer Science Engineering 142 as an elective should elect Computer Science Engineering 120	
Computer software—Computer Science Engineering 140, 150, 160 .....12	
Computer electives .....9	
Hardware emphasis—select courses from Electrical and Computer Science Engineering 114, 118, 151, 172, 175, 177	
Software emphasis—select courses from Computer Science Engineering 120, 122, 142, 152, 165, 168, 170, 172, 175, Electrical and Computer Science Engineering 182A, 182B	
(May include up to 3 units of approved Electrical and Computer Science Engineering or Computer Science Engineering 199.)	
Technical electives .....10	
Humanities-Social Sciences electives and/or General Education electives .....12	

**Total Units for Upper Division Program.....94**

## Electrical Engineering/Materials Science and Engineering

Minimum units required for major: 186.

### UNITS

#### Subject Areas and Courses

Circuits, systems and electronics—Engineering 100, Electrical and Computer Science Engineering 110A, 110B, 111A, 111B, 112 ...16	UNITS
Electromagnetic fields and physical electronics—Electrical and Computer Science Engineering 130A, 130B, 140A .....9	
Electrical Engineering breadth requirements — select nine units from Electrical and Computer Science Engineering 131A, 145A, 151, 157A, 160, 171 .....9	
Professional responsibilities—Engineering 190 .....3	
Engineering science—Engineering 102A, 105A .....6	
Probability Theory—Statistics 120, 131A or Mathematics 131 .....4	
Design electives—select six courses (at least two courses with a laboratory) from Electrical and Computer Science Engineering 114, 118, 132A, 132B, 146A, 146B, 150, 152, 157B, 161, 172, 175, 176, 177, 182A, 182B, Computer Science Engineering 110, 140, 142, 150, 160, 165, 168, 175 (may include approved 192 or 199 course) .....18	
Additional technical electives .....15	
Humanities-Social Sciences electives and/or General Education electives .....12	

**Total Units for Upper Division Program.....98**

## Materials Science and Engineering

Materials Science and Engineering is directed towards an understanding of the structure, properties, and behavior of materials. Society demands new and improved materials with capabilities far superior to common metals, alloys, and ceramics. New materials are needed for high-speed transportation systems, surgical and dental implants, new generations of power plants, and solid-state electronic 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 physical and chemical behavior of engineering materials.

The services of materials engineers are required in many different engineering operations; they study subjects ranging 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 fabrication of steel to 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.

The undergraduate program in materials science and engineering 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. These courses, taken during your first two years, provide a strong foundation in fundamental engineering concepts. In your third year, you will take a set of "fundamentals" courses (Materials Science Engineering 130, 132, 134, 138). With this background in hand, you are then ready for the "applications" courses (Materials Science Engineering 140, 142, 144, 146, 147, 149) which are recommended for the fourth year.

Technical electives, selected from other engineering, or physical and natural science disciplines, give some degree of specialization at the bachelor's degree level. They also provide preparation for research in a selected area at the graduate level.

Twelve technical elective units may be selected to complete the undergraduate Materials Science and Engineering program. By selecting the appropriate technical electives and Humanities and Social Science/General Education electives, you may orient the program to suit your interests and career objectives. These objectives may include production and development, applied research, basic research, teaching, and management.

Upper-division courses in engineering, chemistry, physics, mathematics, and biological sciences are generally acceptable as technical electives in Materials Science and Engineering.

The following technical elective courses and the suggested areas of specialization are guide lines to assist you and your adviser in the preparation of study lists. You may elect to take courses from a number of these areas of specialization, or you may wish to concentrate on one or two areas.

Suggested technical electives:

#### Aerospace Structures:

Aeronautical Science and Engineering 130, 135, 137  
Civil Engineering 131B

#### Automatic Control and Systems Analysis:

Mechanical Engineering 171, 172, 185, 187, 188  
Electrical and Computer Science Engineering 150, 157A, 157B

#### Biomedical Engineering:

Chemistry 107A, 107B

Biological Sciences 1A, 1B  
 Physiology 111A, 111B, 112, 113  
 Physical Education 101, 102

**Chemical Corrosion:**

Chemistry 110A, 110B, 110C or 107A, 107B  
 Chemical Engineering 151, 152A, 152B

**Computers:**

Applied Science Engineering 115  
 Computer Science Engineering 110, 122, 142  
 Electrical and Computer Science Engineering 171, 172, 175, 176, 177, 182A, 182B  
 Mathematics 128A, 128B, 168  
 Statistics 130A, 130B

**Electronic Materials:**

Electrical and Computer Science Engineering 115A, 115B, 140A, 140B, 145A, 145B, 145C, 148

Physics 121, 140A, 140B

**Environmental Engineering:**

Engineering 160  
 Atmospheric Science 120  
 Biochemistry and Biophysics 101A, 101B  
 Water Science 41  
 Chemistry 8A, 8B  
 Civil Engineering 149A

**Heat Transfer:**

Engineering 105B  
 Mechanical Engineering 165  
 Chemical Engineering 150A, 153

**Materials Design and Processing:**

Aeronautical Science and Engineering 137  
 Engineering 104B, 106  
 Mechanical Engineering 150A, 150B, 150L, 151, 152, 185  
 Civil Engineering 139

**Physics of Solids:**

Physics 115A, 115B, 140A, 140B  
 Electrical and Computer Science Engineering 145A, 145B, 145C, 148

Suggested advisers: J.C. Gibeling, D.G. Howitt, A.K. Mukherjee, Z.A. Munir, J. F. Shackelford.

**Materials Science and Engineering**

Minimum units required for major: 184.

UNITS

**Subject Areas and Courses**

Electronic circuits—Engineering 100	4
Applied mechanics—Engineering 102A, 103A, 104A	9
Applied thermodynamics—Engineering 105A, 130	6
Engineering design elective—select from Aeronautical Science and Engineering 137, Civil Engineering 132A, 132B, 133, Mechanical Engineering 150A, 150B, 150L	6
Materials in design—Materials Science Engineering 140, 149	6
Measurements and laboratory—Materials Science Engineering 132L, 134L, 138L, 140L, 142L, 144L; Mechanical Engineering 176	9
Materials science—Materials Science Engineering 132, 134, 138, 142, 144, 147	18
Applied mathematics—Engineering 180	3
Basic science—Chemistry 110A and 110C or Physics 140A-140B	6
Technical electives (Engineering 104B recommended)	12
Humanities-Social Sciences electives and/or General Education electives	15
<b>Total Units for Upper Division Program</b>	<b>94</b>

## Mechanical Engineering

The mechanical engineer uses basic science in the design and manufacture of complex engineering systems requiring the application of physical and mechanical principles in the development of machines, energy conversion systems, materials, and equipment for guidance and control.

Preparation for this broad field of engineering requires a thorough knowledge of mathematics, physics, chemistry, fluid mechanics, thermodynamics, heat transfer, mass transfer, electricity, manufacturing processes, properties of materials, and economics.

The Mechanical Engineering curriculum is based on a common core of engineering courses taken in the first two years. Your third year is spent in further study of fundamental courses, and in the fourth year you may tailor your studies to your own interests by selecting courses in controls and systems analysis, fluid mechanics, heat transfer, thermodynamics, mechanical design, and materials science. You can either prepare for graduate study in Mechanical Engineering or obtain a broad background for entering engineering practice at the bachelor's level.

You are encouraged to select elective courses from among the areas of specialization listed below.

### AREAS OF SPECIALIZATION:

**Creative 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 solutions to such major social problems as environmental pollution, lack of mass transportation, and shortages of raw materials 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 solve a variety of problems. In addition to having technical competence, the designer must be able to consider the socioeconomic consequences of the design and its possible impact on the environment. Product safety, reliability, and economics are other considerations.

**Suggested technical electives:**  
 Aeronautical Science and Engineering 130  
 Agricultural Engineering 119, 165  
 Applied Science Engineering 115  
 Civil Engineering 131B

Engineering 111, 118, 122, 160  
 Materials Science Engineering 140, 142  
 Mechanical Engineering 134, 150B, 150L, 151, 152, 162, 172, 184A, 184B, 185, 187, 188

**Suggested advisers:** C.W. Beadle, A.A. Frank, J.M. Henderson, M.L. Hull, B. Ravani, S. Velinsky, A.T. Yang.

**Energy Systems.** This area is specifically designed for those who would like to work in the fields of power generation, propulsion for transportation, and energy conversion. It is in these fields that the increased efficiency of systems and the impact of potential environmental pollution are assuming more importance in the design stage.

The program of study is based on the fundamentals of fluid mechanics, thermodynamics, and heat transfer. These fundamentals are applied to combustion engines, gas turbines, heat exchangers, nuclear reactors, MHD power generators, solar energy systems, and others.

**Suggested technical electives:**  
 Engineering 160  
 Mechanical Engineering 162, 186

**Suggested advisers:** J.W. Baughn, H. Brandt, H.A. Dwyer, M.A. Hoffman, I. Kennedy, W. Kollmann, J. Mantzaras, A.A. McKillop.

**Systems 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.

Systems Dynamics and Control is 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.

Graduate research includes projects on continuously variable transmissions, active and semi-active suspension systems, anti-skid braking systems, electromechanical actuator design, design and control of walking machines, electronically controlled steering, mathematical models of motorcycle dynamics, and the analysis of fuel management systems.

An Automotive System Dynamics Laboratory is being developed for testing components such as engines, transmissions, brakes, and steering systems as well as completing test vehicles. As plans for on-campus laboratories and a test track proceed, ten experimental vehicles are housed in a rented facility and research on vehicle components proceeds in various Mechanical Engineering laboratories.

Suggested technical electives:

Aeronautical Science and Engineering 128, 129, 131  
 Mechanical Engineering 134, 152, 172, 184A, 184B, 187

Engineering 122

**Suggested advisers:** J.W. Brewer, A.A. Frank, R.A. Hess, M. Hubbard, D.C. Karnopp, D.L. Margolis.

**Transportation Systems.** An important aspect of Mechanical Engineering is the planning, design, and operation of 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.

Suggested technical electives:

Aeronautical Science and Engineering 127, 128, 129  
 Civil Engineering 131A, 149A, 160  
 Engineering 122, 160  
 Mechanical Engineering 134, 152, 162, 172, 184A, 184B, 187

**Suggested advisers:** A.A. Frank, M. Hubbard, D.C. Karnopp, D.L. Margolis.

## Mechanical Engineering

(Accredited by the Engineering Accreditation Commission of the Accreditation Board for Engineering and Technology.)

Minimum units required for major: 186.

UNITS

**Subject Areas and Courses**

Electronic circuits—Engineering 100	4
Applied mechanics—Engineering 102A, 102B, 104A, 104B	12
Applied thermodynamics—Engineering 105A, 105B	10
Fluid mechanics—Engineering 103A, 103B	6
Mechanical engineering design—Mechanical Engineering 150A, 150B, 150L, or 172, and one course from 184A-184B, 185, 186, 187, 188	13

Controls and systems analysis—Mechanical Engineering 171

Measurements and laboratory—Engineering 102L, 103L, 105L, Mechanical Engineering 176

Professional responsibilities—Engineering 190

Applied mathematics—Engineering 180

Technical electives

Select 12 of the 20 units from upper division Engineering or Mechanical Engineering courses. In order to satisfy design requirements, select three courses (of the 12 units) from the follow-

ing: Engineering 122, Materials Science Engineering 140, Aeronautical Science and Engineering 129, 130, Mechanical Engineering 150B, 172, 184A-184B, 185, 186, 187, 188 (Select the remaining courses from courses not used for design requirements above), 134, 151, 152, 162.	
Humanities-Social Sciences electives and/or General Education electives .....	15
<b>Total Units for Upper Division Program.....</b>	<b>96</b>
<b>Mechanical Engineering/Materials Science and Engineering</b>	
Minimum units required for major: 192.	
	UNITS
<b>Subject Areas and Courses</b>	
Electronic circuits—Engineering 100 .....	4
Applied mechanics—Engineering 102A, 102B, 104A, 104B.....	12
Applied thermodynamics—Engineering 105A, 105B; Materials Science Engineering 130; Mechanical Engineering 165 .....	13
Fluid mechanics—Engineering 103A, 103B.....	6
Mechanical engineering design—Mechanical Engineering 150A, 150B, 150L, or 172, and one course from 184A-184B, 185, 186, 187, 188.....	13
Controls and systems analysis—Mechanical Engineering 171 .....	4
Materials science—Materials Science Engineering 132, 132L, 134, 134L, 138, 138L, and two courses from Materials Science Engineering 140, 142, 144, 147 .....	18
Measurements and laboratory—Engineering 102L, 103L, 105L, Mechanical Engineering 176.....	6
Applied mathematics—Engineering 180 .....	3
Professional responsibilities—Engineering 190.....	3
Technical electives .....	5
In order to satisfy design requirements, select two courses from Aeronautical Science and Engineering 129, 130, Materials Science Engineering 140, 149, Mechanical Engineering 150B, 172, 184A-184B, 185, 186, 187, 188. (courses not used for design units above) 134, 151, 152, 162.	
Humanities-Social Sciences electives and/or General Education electives .....	15
<b>Total Units for Upper Division Program.....</b>	<b>102</b>

## Courses in Engineering

### Lower Division Courses

#### 3. Introduction to Engineering Systems (3) I, II.

The Staff (Chairperson in charge)

Lecture—2 hours; laboratory—3 hours. Prerequisite: algebra and trigonometry. Introduction to the engineering profession. General view of the engineering process as obtained by participation in laboratory experiments illustrative of the solution of representative, but greatly simplified, engineering problems. (P/NP grading only.)

#### 4. Engineering Graphics in Design (3) I, II. Henderson

Lecture—2 hours; laboratory—3 hours. Principles of descriptive geometry and of mechanical and free-hand drawing; their application in the representation, visualization, and solution of engineering problems. Computer-aided graphics. Introduction to engineering design. (CAN Engr 2)

#### 5. Applications of Computers (3) I, II, III. The Staff

Lecture—2 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A. Not intended for Electrical Engineering or Computer Science and Engineering majors. Digital computation and computer programming in FORTRAN. Algorithms and their description. Basic programming; debugging of programs; approximate computing-accuracy and significance; solving simple numerical and nonnumerical problems. Students who complete this course or the

equivalent and transfer into an Electrical Engineering or Computer Science and Engineering major, should take the Engineering 5-Computer Science Engineering 32 sequence as opposed to the Engineering Computer Science 30-40 sequence. (CAN CSci 4)

#### 17. Circuits (3) I, II, III. The Staff

Lecture—3 hours. Prerequisite: Mathematics 22B (may be taken concurrently); Physics 9C. 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. (CAN Engr 6)

#### 20. The Technological World (3) II. Kemper

Lecture—3 hours. Prerequisite: high school algebra. The nature of technology; computers and automation; energy systems; engineering design, analysis, and problem solving; metric system; patents and creativity. Technology and social change; technology assessment and technological choices. Intended primarily for students who are not engineering or science majors. Engineering or physical science students may receive only 2 units of credit. General Education credit: Nature and Environment/Introductory.

#### 35. Statics (3) I, II, III. The Staff (Shen in charge)

Lecture—3 hours. Prerequisite: Mathematics 22C (may be taken concurrently); Physics 9A. Force systems and equilibrium conditions with emphasis on engineering problems. (CAN Engr 8)

#### 45. Properties of Materials (4) I, II, III. The Staff

Lecture—3 hours; laboratory—3 hours. Prerequisite: sophomore student in Engineering. Introductory course on the properties of engineering materials and their relation to the internal structure of materials. (CAN Engr 4)

### Upper Division Courses

#### 100. Electronic Circuits and Systems (4) I, II, III.

The Staff (Chairperson in charge)

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 17. Introduction to theory and application of analog and digital circuits and systems. It is strongly recommended that students enroll in this course as soon as possible after completing Engineering 17.

#### 102A. Dynamics (3) I, II, III. The Staff (Henderson in charge)

Lecture—3 hours. Prerequisite: course 35; Mathematics 22B, 22C. Kinematics and kinetics of particles, of systems of particles, and of rigid bodies applied to engineering problems.

#### 102B. Dynamics (3) II, III. The Staff (Henderson in charge)

Lecture—3 hours. Prerequisite: course 102A; open to College of Engineering students only. Topics in three-dimensional rigid-body dynamics; elementary dynamics of vibrating systems; introduction to energy methods.

#### 102L. Dynamics Laboratory (1) II, III. The Staff (Beadle in charge)

Lecture—1 hour; laboratory—1 hour. Prerequisite: course 102B (may be taken concurrently). Experimental laboratory to demonstrate fundamental principles of dynamics and their application to engineering problems. Introduction to instrumentation for dynamic motion measurement.

#### 103A. Elementary Fluid Mechanics (3) I, II, III. The Staff (Brandt in charge)

Lecture—3 hours. Prerequisite: course 102A (may be taken concurrently). Fluid properties; fluid statics; continuity and linear momentum equations for control volumes; flow of incompressible fluids in pipes; dimensional analysis.

#### 103B. Elementary Fluid Mechanics (3) II, III. Chatot, Hafez

Lecture—3 hours. Prerequisite: course 103A; open to College of Engineering students only. Incompressible viscous flow; boundary layer flow; one-dimensional compressible flow; fluid measurements; applications.

#### 103L. Fluid Mechanics Laboratory (1) II, III. White

Lecture—1 hour, discussion—1 hour, and laboratory—1 12 hours. (alternate weeks with course 105L). Prerequisite: course 103B (may be taken concurrent-

ly). Basic principles and devices which are common in fluid mechanics are illustrated with a series of experimental demonstrations. Experiments are concerned with flow, pressure and viscosity measurement. (P/NP grading only.) Not open for credit to students who have completed Civil Engineering 141L.

#### 104A. Mechanics of Materials (3) I, II. The Staff (Shen in charge)

Lecture—3 hours. Prerequisite: course 35; Mathematics 22B. Open to Engineering students only. Uniaxial loading and deformation; general concepts of stress-strain-temperature relations and yield criteria; stresses in thin-walled pressure vessels; torsion of shafts; bending of symmetrical beams.

#### 104B. Mechanics of Materials (3) II, III. The Staff (Shen in charge)

Lecture—3 hours. Prerequisite: course 104A. Open to Engineering students only. Deflections due to bending of beams, unsymmetrical bending; application of energy methods to bending problems; yielding and plastic deformation in beams, limit analysis; buckling of columns.

#### 104L. Mechanics of Materials Laboratory (1) II, III. Hutchinson

Laboratory—3 hours. Prerequisite: course 104B (may be taken concurrently). 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.

#### 105A. Thermodynamics (3) I, II, III. Dwyer, Kollmann

Lecture—3 hours. Prerequisite: Mathematics 22B, 22C; open to College of Engineering students only. Fundamental concepts of thermodynamics, heat energy and work, properties of pure substances, First Law and Second Law for closed and open systems, reversibility, entropy, thermodynamic temperature scales. Power cycles; Carnot, Rankine, Brayton, and applications of thermodynamics to engineering systems.

#### 105B. Thermodynamics (3) I, II, III. McKillop

Lecture—3 hours. Prerequisite: course 105A; open to College of Engineering students only. Irreversibility and availability, thermodynamic relations, gas and vapor mixtures, and chemical reactions.

#### 105L. Thermodynamics Laboratory (1) II, III. Baughn

Lecture—1 hour, discussion—1 hour, and laboratory—1 1/2 hours (alternate weeks with course 103L). Prerequisite: course 105B (may be taken concurrently). Demonstrations and experiments to illustrate the principles of state, the first and second laws of thermodynamics, and thermodynamic cycles. (P/NP grading only.)

#### 106. Engineering Economics (3) II, III. Hartsough, Slaughter

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.

#### 111. Electric Power Equipment (3) I, III. Chancellor, Hartsough

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 17. Principles of AC and DC electric motors and solenoids, their control systems and power sources. Selection of electric power equipment components based on their construction features and performance characteristics.

#### 122. Introduction to Mechanical Vibrations (3) I. Beadle

Lecture—3 hours. Prerequisite: course 102B. Free and forced vibrations in lumped-parameter systems with and without damping; vibrations in coupled systems; electromechanical analogs; use of energy conservation principles.

#### 160. Environmental Physics and Society (3) I. Jungerman, Craig

Lecture—3 hours. Prerequisite: Physics 9D, 5C, or 10 or 1B and Mathematics 16B or the equivalent.

## 210 Engineering: Agricultural

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 Physics 160.) General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Physics 10.

**162. Advanced Energy Technology** (4) I. Craig  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 105A or consent of instructor. Technical overview of energy technologies. Emphasis on semi-quantitative understanding. About 20 percent of course is policy oriented. Designed to mesh with course 160, which is primarily policy. (P/NP grading only.) Offered in odd numbered years.

**180. Engineering Analysis** (3) I, III. Hafez, Brandt  
Lecture—3 hours. Prerequisite: Mathematics 22B. Analysis of steady-state and nonsteady-state problems for discrete and continuous systems; analytic and approximate solutions. Typical engineering problems in heat transfer, fluid mechanics, electrical networks, mechanical vibrations, and elasticity.

**190. Professional Responsibilities of Engineers** (3) II, III. The Staff  
Lecture—3 hours; laboratory—1 hour. Prerequisite: upper division standing. Organization of the engineering profession; engineering and management; introduction to contracts, specifications, and business law; technical writing; oral presentations on the interactions between engineering and society.

### Graduate Courses

**254. Manufacturing Engineering** (3) II. Dorf  
Lecture—3 hours. Prerequisite: course 106, Statistics 120, and Electrical and Computer Science Engineering 157A or Mechanical Engineering 172. Manufacturing and process engineering, productivity, planning, production and operations, inventory and facilities, quality, robots and flexible manufacturing systems.

**291. Seminar in Teaching** (1) III. Baughn  
Seminar—1 hour. Discussion of previous experience as a student and actual practice as a teacher. (S/U grading only.)

James W. Rumsey, M.S., Lecturer  
Thomas R. Rumsey, Ph.D., Associate Professor  
Verne H. Scott, Ph.D., Professor Emeritus  
R. Paul Singh, Ph.D., Professor  
David C. Slaughter, Ph.D., Assistant Professor  
Henry E. Studer, M.S., Professor  
Shrinivasa K. Upadhyaya, Ph.D., Associate Professor  
Wesley W. Wallender, Ph.D., Associate Professor  
Wesley E. Yates, M.S., Professor Emeritus

## Courses in Engineering: Agricultural

### Lower Division Courses

#### 1. Introduction to Agricultural Engineering (1) II.

The Staff

Lecture—1 hour. Introduction to the types of problems addressed by agricultural engineers. Selected problems in field machinery design and management, irrigation, agricultural structures, properties of agricultural materials, and waste management. Review of employment opportunities.

#### 2. Introduction to Forest Engineering (1) III. Hartsough

Discussion-laboratory—3 hours. Introduction to the engineering aspects of forestry problems, including nursery operations, reforestation, harvesting, log transport, milling and residue utilization. (P/NP grading only.)

#### 92. Internship in Agricultural Engineering (1-5) I, II, III. The Staff (Studer in charge)

Work-learn experience. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work-study experience in agricultural engineering. May be repeated for credit. (P/NP grading only.)

#### 98. Directed Group Study (1-5) I, II, III. The Staff (Studer in charge)

Prerequisite: consent of instructor. Group study of selected topics; restricted to lower division students. (P/NP grading only.)

#### 99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Studer in charge)

(P/NP grading only.)

### Upper Division Courses

#### 112. Combustion Engines (4) II. Jenkins

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 5 and 105A. Theory of design and operating characteristics of internal and external combustion engines. Thermodynamics of relevant power cycles, performance testing, engine mechanics, fuel metering systems, ignition systems for both spark-ignited and compression-ignited engines. Design for engine applications. Comparison of alternative fuels and engines.

#### 114. Principles of Field Machinery Design (3) III. Studer

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 102A. Functional requirements and basic operating principles of field machines; elements of field machinery design; use of instrumentation and computer techniques for analysis of specific machines.

#### 115. Forest Engineering (3) III. Hartsough

Lecture—3 hours. Prerequisite: Civil Engineering 10, Engineering 102A and 104A; Forestry and Resource Management 100A, 100B, 100C, 100D (Berkeley campus) strongly recommended. Applications of engineering principles to problems in the forest industry, including consideration of nursery operations, reforestation, harvesting, road layout, log transport and milling operations.

#### 116. Forest Engineering Field Problems (2) I. Miles

Lecture—1 hour; three weekend field trips to Blodgett Forest. Prerequisite: course 114 or 115. A field study and critical analysis of operations, techniques, and equipment common in forest management, with particular consideration to measurements, data analysis, safety of operations, and maintenance practices.

#### 117. Stability and Traction of Off-Road Vehicles (2) I. Chen

Lecture—2 hours. Prerequisite: Engineering 102A

and 104A. Drive train elements, suspensions, tires, tracks, chassis configuration and steering system mechanics for heavy-duty vehicles. Performance, stability, and traction during pulling, turning, and transport. Vehicle interactions with off-road terrain conditions.

#### 119. Hydraulic Systems (3) III. Chen

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 103A. Principles of operation, characteristics, testing and selection of hydraulic system components: pumps, motors, cylinders, control elements, and accessories. Design and analysis of hydraulic systems.

#### 125. Agricultural Structures: Environmental Aspects (3) II. Jenkins

Lecture—3 hours. Prerequisite: Engineering 105A. Fundamentals of heat transfer, solar radiation, psychrometrics, ventilation, animal energetics, lighting with respect to plant growth, atmospheric properties with respect to storage of agricultural products. Application of this information to the design of animal and plant production and product storage structures.

#### 132. Unit Operations in Food Engineering (4) III.

Singh, T. Rumsey

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103A, 105A. Mechanical unit operations applied to such processes as non-Newtonian flow, size reduction, sorting and mixing of granular materials. Thermal operations related to refrigeration, freezing, evaporation and drying of foods.

#### 145. Irrigation and Drainage Systems (4) II. Wallender, Grismer, Hills

Lecture—4 hours. Prerequisite: Engineering 103A or Water Science 142. Engineering and scientific principles applied to the design of surface, sprinkle and micro irrigation systems and drainage systems within economic and environmental constraints. Interaction between irrigation and drainage will be emphasized. (Same course as Water Science 145.)

#### 165. Digital Instrumentation in Agricultural Engineering (4) I. Delwiche

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100. Digital logic concepts and devices; assembly language programming; data acquisition and control.

#### 170A. Engineering Projects: The Design and Evaluation Process (2) I. Miles

Lecture—1 hour; laboratory—3 hours. Prerequisite: two courses from the following (one may be taken concurrently) — courses 114, 115, 125, 132, Civil Engineering 145, Mechanical Engineering 150A, Water Science 160. Principles and procedures for project design and evaluation with emphasis on agricultural and forestry projects. Project selection, data sources, agricultural and forestry factors, specifications, failure modes, human factors, safety, test design, measurement techniques. Develop proposals for course 170B.

#### 170B. Engineering Projects: Design (3) II. Miles

Laboratory-discussion—three 2-hour sessions. Prerequisite: course 170A. Individual or group projects involving the design of devices, structures, or systems to solve specific problems in agriculture or forestry. Students may select their projects, subject to approval of instructor.

#### 170C. Engineering Projects: Design Evaluation (3) III. Miles

Laboratory—three 3-hour sessions. Prerequisite: course 170B strongly recommended. Individual or group projects involving fabrication, assembly and testing of components, devices, structures or systems designed to solve specific problems in agriculture or forestry. Projects selected by the instructor from those designed in course 170B.

#### 192. Internship in Agricultural Engineering (1-5) I, II, III. The Staff (Studer in charge)

Work-Learn experience. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work-study experience in agricultural engineering. May be repeated for credit. (P/NP grading only.)

- 198. Directed Group Study** (1-5) I, II, III. The Staff (Studer in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)
- 199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Studer in charge)  
(P/NP grading only.)

#### Graduate Courses

- 215. Soil-Machine Relations in Tillage and Traction** (3) I. Chancellor

Lecture—3 hours. Prerequisite: course 114 or 117. 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.

- 216. Energy Systems in Agriculture** (3) III. Jenkins

Lecture—3 hours. Prerequisite: Engineering 105A. Theory and application of energy systems in agriculture. Analysis of energy transformation processes and optimal systems design utilizing stock and flow energy resources. Offered in even-numbered years.

- 220. Pilot Plant Operations in Aquacultural Engineering** (3) III. Piedrahita

Lecture—1 hour; laboratory—6 hours. Prerequisite: Civil Engineering 243A-243B or Agricultural Engineering Technology 161A-161B. Topics in water treatment as they apply to aquaculture operations. Laboratory study of unit operations in aquaculture. Offered in even-numbered years.

- 235. Advanced Unit Operations in Process and Food Engineering** (3) II. T. Rumsey

Lecture—3 hours. Prerequisite: an upper division course in process or food engineering. Basic procedures applicable to process and food engineering. Heat and mass transfer applications to drying, dehydration and freezing; flow of food and semi-fluid materials; size reduction; respiration of bio-materials.

- 240. Infiltration and Drainage** (3) II. Grismer

Lecture—3 hours. Prerequisite: Soil Science 107; Water Science 140. Aspects of multiphase flow in soils and their application to infiltration and drainage. Gas phase transport and entrapment during infiltration, and transient drainage with nonlinearity, capillarity, and evapotranspiration considered. Offered in odd-numbered years. (Same course as Water Science 240.)

- 241. Sprinkle and Trickle Irrigation Systems** (3) III. Hills

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 145 (may be taken concurrently). Computerized design of sprinkle and trickle irrigation systems. Techniques for field evaluation of pressurized irrigation systems. Incorporation of water treatment, chemigation, and automation in these systems.

- 242. Hydraulics of Surface Irrigation** (3) III. Wallender

Lecture—3 hours. Prerequisite: a course in differential and integral calculus; a course in hydraulics or fluid mechanics including some open-channel flow; a course in irrigation principles. Mathematical models of surface-irrigation systems for prediction of the ultimate disposition 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.

- 245. Agricultural Wastes Management** (3) II. Hills

Lecture—3 hours. Animal, crop and food processing wastes; pesticides, fertilizers, odors, dust and smoke in relation to environmental pollution. Disposal needs, present and future. Regulation, economics and public concern; coordination with municipal and industrial wastes management. Offered in even-numbered years.

- 250. Design of Mechanical Systems** (2) I.

Lecture—2 hours. Prerequisite: mechanical design and economics recommended. Experience with design; evaluating design concepts and establishing design criteria; analysis and synthesis in design; optimization techniques; human factors in design.

- 260. Analog Instrumentation** (4) II. Delwiche

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 odd-numbered years.

- 265. Design and Analysis of Engineering Experiments** (4) II. Upadhyaya

Lecture—3 hours; laboratory—3 hours. Prerequisite: at least one undergraduate course in statistics or consent of instructor. Design, management, and analysis of engineering experiments with emphasis on criteria for the selection and utilization of statistical methods. Problems necessitating the use of campus and departmental computing facilities will be assigned.

- 270. Modeling and Analysis of Biological and Physical Systems** (3) III. Upadhyaya, T. Rumsey

Lecture—3 hours. Prerequisite: Civil Engineering 212A. Mathematical modeling of biological systems: model development; analytical and numerical solutions. Case studies from various specializations within Agricultural Engineering. Offered in odd-numbered years.

- 275. Physical Properties of Agricultural Materials**

(3) I. Chen

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 agricultural materials.

- 289A-D. Selected Topics in Agricultural Engineering** (1-5) I, II, III. The Staff (Studer in charge)

Lecture, laboratory, or combination. Prerequisite: consent of instructor. Directed group study of selected topics with separate sections: (A) Simulation of Food Processing Systems; (B) Thermal Process Design; (C) Fermentation Engineering; (D) Alternate Energy Systems.

- 290. Research Methods in Agricultural Engineering** (2) I. Giles

Lecture—1 hour; discussion-laboratory—1 hour. Prerequisite: graduate student standing or consent of instructor. Planning, execution, and reporting of research projects. Literature review techniques and proposal preparation. Identification of sources for support of research. Oral presentation of research results. Written presentation of research results, manuscript preparation, submission, and review.

- 290C. Graduate Research Conference** (1) I, II, III.

The Staff (Studer in charge)

Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress and techniques in agricultural engineering. May be repeated for credit. (S/U grading only.)

- 297. Advances in Food Engineering** (1) I, II, III.

Singh

Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in food engineering. Presentations by individual students. (S/U grading only.)

- 297T. Supervised Teaching in Agricultural Engineering** (1-3) I, II, III. Singh

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 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.)

- 298. Group Study** (1-5) I, II, III. The Staff (Studer in charge)

- 299. Research** (1-12) I, II, III. The Staff (Studer in charge)

(S/U grading only.)

## Engineering: Applied Science

**211**

## Engineering: Applied Science

(College of Engineering)

Frederick Wooten, Ph.D., Chairperson of the Department

Yin Yeh, Ph.D., Vice Chairperson of the Department  
Department Office, 228 Walker Hall (916-752-0360)

#### Faculty

- Berni J. Alder, Ph.D., Professor  
Roger E. Anderson, Ph.D., Lecturer  
Meera M. Blattner, Ph.D., Associate Professor  
Stewart D. Bloom, Ph.D., Professor Emeritus  
Stewart Cameron, Ph.D., Assistant Professor  
Ralph Carlson, Ph.D., Lecturer  
Charles Cerjan, Ph.D., Lecturer  
Richard Christensen, Ph.D., Professor  
Paul P. Craig, Ph.D., Professor  
John S. De Groot, Ph.D., Professor  
Farid Dowla, Ph.D., Lecturer  
R. Paul Drake, Ph.D., Professor  
Michael Feit, Ph.D., Lecturer  
John Feo, Ph.D., Lecturer  
J. Patrick Fitch, Ph.D., Lecturer  
John G. Fletcher, Ph.D., Lecturer  
Roger A. Haas, Ph.D., Professor  
William G. Hoover, Ph.D., Professor  
David Q. Hwang, Ph.D., Associate Professor  
John Killeen, Ph.D., Professor  
William L. Kruer, Ph.D., Lecturer  
Nelson Max, Ph.D., Professor  
Andrew McMahan, Ph.D., Lecturer  
Arthur A. Mirin, Ph.D., Lecturer  
William A. Newcomb, Ph.D., Adjunct Professor  
Ann Orel, Ph.D., Assistant Professor  
Richard F. Post, Ph.D., Professor Emeritus  
Harry B. Radousky, Ph.D., Lecturer  
Garry Rodrigue, Ph.D., Professor  
Bruce Shore, Ph.D., Lecturer  
E. Eugene Schultz, Ph.D., Lecturer  
Stephen K. Skedzielewski, Ph.D., Lecturer  
Wilson K. Talley, Ph.D., Professor  
Edward Teller, Ph.D., University Professor Emeritus  
Richard Van Konynenburg, Ph.D., Lecturer  
Rao Vemuri, Ph.D., Professor  
Richard W. Watson, Ph.D., Lecturer  
Frederick Wooten, Ph.D., Professor  
Yin Yeh, Ph.D., Professor

## Courses in Engineering: Applied Science

#### Davis

##### Lower Division Courses

- 98. Directed Group Study** (1-5) I, II, III. The Staff (Wooten in charge)

Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

- 99. Special Study for Undergraduates** (1-5) I, II, III.

The Staff (Wooten in charge)

Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

##### Upper Division Courses

- 115. Introduction to Numerical Methods for Engineers and Scientists** (3) I, II, III. The Staff (Wooten in charge)

Lecture—3 hours. Prerequisite: Engineering 5; Mathematics 22B. Introduction to error analysis, roots of equations, interpolation, quadrature, eigenproblems, systems of linear algebraic equations, ordinary differential equations, and deterministic and stochastic algorithms. Lectures and computational assignments on the application of digital computers to problems in engineering and science.

- 116. Computer Solution of Physical Problems** (3)

II, III. De Groot

Lecture—3 hours. Prerequisite: course 115 or consent of instructor. Application of computers to solu-

tion of physical problems. Numerical solution of elliptic, parabolic, and hyperbolic partial differential equations; eigenvalue problems, Monte Carlo methods, linear programming.

**135. Introductory Nuclear Science and Technology** (3) I. The Staff

Lecture—3 hours. Prerequisite: Physics 121 or the equivalent. Introductory aspects of nuclear phenomena, nuclear masses, size, energy, and decay modes. Interaction of particles and electromagnetic radiation with matter. Instrumentation and theory of measurements; neutron technology. Nuclear chemistry.

**137. Science and Technology of Nuclear Arms Effects and Control** (3) I. Jungerman (Physics), Craig

Lecture—3 hours. Prerequisite: upper division standing; one course from Physics 1B, 5B, 9D, or 10. Scientific and technical aspects of nuclear arms effects and nuclear arms control including the nuclear physics of atomic and hydrogen bombs, blast and radiation effects, radioactivity, electromagnetic pulse, ICBM accuracy, laser weapons, verification safeguards, biological and ecological effects. Emphasis on order of magnitude calculations. (Same course as Physics 137.) General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Physics 10.

**147. Arms Race Technologies and Strategies** (3) I. Craig

Lecture—2 hours; discussion—1 hour. Prerequisite: course 137/Physics 137. Technological and strategic issues in the nuclear arms race. Characteristics of nuclear weapons and weapons defense systems; responses and counter-responses. Advantages and disadvantages of alternative realizations of weapons systems.

**165A. Quantum Optics I** (3) II. Yeh

Lecture—3 hours. Prerequisite: Physics 110A-110B or the equivalent. Quantum nature of light and matter. Statistics of photons in chaotic, coherent and mixed states. Concepts of photon coherence and correlation. Development of a coherent state from a chaotic photon distribution.

**165B. Quantum Optics II** (3) III. Yeh

Lecture—3 hours. Prerequisite: course 165A or the equivalent. Quantum nature of interaction between light and matter: photoelectric counting statistics. Photon distributions in scattering processes and in nonlinear optical processes.

**166A. Quantum Optics Laboratory** (1) II. Yeh

Laboratory—3 hours. Prerequisite: course 165A concurrently. On hand experience in working with lasers, photon spectroscopy, electro-optical devices and photoelectric counting statistics.

**166B. Quantum Optics Laboratory** (1) III. Yeh

Laboratory—3 hours. Prerequisite: course 165B concurrently. Continuation of course 166A.

**180. Introduction to Plasma Physics and Controlled Fusion** (3) I. De Groot

Lecture—3 hours. Prerequisite: Physics 110B and 112A, or consent of instructor. Equilibrium plasma properties, plasma sources, plasma diagnostics, magnetohydrodynamics, kinetic theory, plasma stability, plasma confinement systems and approaches to controlled thermonuclear fusion.

**181. Plasma Physics Laboratory** (1) I. De Groot

Laboratory—3 hours. Prerequisite: course 180 (concurrently). Langmuir probes, plasma sources, Landau damping of ion acoustic waves, ion acoustic shocks, ion-ion two-stream instability.

**198. Group Study** (1-5) I, II, III. The Staff (Wooten in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Wooten in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**228A-228B-228C. Properties of Matter** (3-3-3) I-II-III. Hoover

Lecture—3 hours. Prerequisite: Mathematics 22B and Physics 112B. Microscopic and macroscopic descrip-

tions of matter; thermodynamics and kinetics; constitutive, electrical, mechanical and thermal properties.

**230A-230B-230C. Structure of Matter** (3-3-3) I-II-III. Yeh

Lecture—3 hours. Prerequisite: course 205C. Classical properties of matter; introduction of quantum mechanics by the correspondence principle; perturbation theory; electron theory of atoms, molecules, and solids; quantum theory of cooperative effects.

**234A-234B-234C. Electromagnetic Theory** (3-3-3) I-II-III. DeGroot

Lecture—3 hours. Prerequisite: Electrical and Computer Science Engineering 131B. Review basic electromagnetic field theory. Special relativity. Charges in fields. Radiation from charges: generation, scattering, diffraction. Electrodynamics of continuous media: conductors, dielectrics, superconductors, magnetic materials, plasmas. Transmission of electromagnetic waves through material. Modern applications of theory.

**280A-280B-280C. Plasma Physics and Controlled Fusion** (3-3-3) I-II-III. De Groot

Lecture—3 hours. Prerequisite: course 234B or 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.

**285A-285B-285C. Advanced Plasma Physics** (3-3-3) I-II-III. Drake

Lecture—3 hours. Prerequisite: courses 280A-280B-280C. Plasma kinetic theory; applications of the Fokker-Planck equation; advanced instability theory. Practical problems of plasma production and confinement. Nonlinear and relativistic effects including quasi-linear theory, relativistic beams, synchrotron radiation and laser heating of plasmas. Computer simulation of plasma phenomena.

**289A-J. Special Topics in Applied Science** (1-5) I, II, III. The Staff (Wooten in charge)

Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: (A) Atomic and Molecular Physics; (B) Chemical Physics; (C) Computational Physics; (D) Computer Science; (E) Materials Science; (F) Nuclear Science; (G) Nonlinear Optics; (H) Plasma Physics; (I) Quantum Electronics; (J) Solid State. May be repeated up to a total of 5 units per segment.

**290. Seminar** (1-2) I, II, III. The Staff (Wooten in charge)

Seminar—1-2 hours. (S/U grading only.)

**290C. Graduate Research Group Conference** (1) I, II, III. The Staff

Discussion—1 hour. Prerequisite: consent of instructor. May be repeated for credit. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Wooten in charge)

(S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Wooten in charge)

(S/U grading only.)

**Livermore**

**Upper Division Courses**

**101. Data Structures** (3) I. The Staff

Lecture—3 hours. Prerequisite: consent of instructor. Introduction to high level language programming techniques that are useful in all programming courses. Topics include programming language Pascal, lists, queues, trees, graphs, sorting and searching algorithms, and memory management algorithms.

**103. Introduction to Computer Architecture** (3) I. The Staff

Lecture—3 hours. Prerequisite: consent of instructor. Basic hardware knowledge for computer science students. Main elements of computer hardware and how they function. Covers topics like number systems, symbolic logic, assembly language, and logic implementation. Several assembly language programs are required.

**106. Language Structures** (3) II. The Staff

Lecture—3 hours. Prerequisite: course 101 or the equivalent. Fundamental structure of a programming language, and an introduction to language processing. Topics include types, objects, operations, block structure, parameter passing, linkers and loaders, and lexical analysis.

**108. Concurrent Programming** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 103 or 106 or the equivalent. Presentation of concepts surrounding concurrent programming, as an introduction to operating systems. Focus on concepts of processes and synchronization, emphasizing their use in solving classical problems. This material is then related to operating system design.

**111. Introduction to Foundations of Computing** (3) II. Blattner

Lecture—3 hours. Prerequisite: course 101; Computer Science Engineering 100. Basic ideas in the theory of computing and the analysis of algorithms. Topics included: finite automata, regular and context-free grammars, order of execution time and space, advanced programming techniques.

**113. Computer Graphics** (3) II. Max

Lecture—3 hours. Prerequisite: Mathematics 21C, 22A, Computer Science Engineering 40. Development of the algorithms for producing perspective line drawings of three-dimensional objects, as defined by polygons or by bicubic surface patches.

**115. Introduction to Numerical Methods for Engineers and Scientists** (3) I, II, III. The Staff (Wooten in charge)

Lecture—3 hours. Prerequisite: Engineering 5; Mathematics 22B. Introduction to error analysis, roots of equations, interpolation, quadrature, eigenproblems, systems of linear algebraic equations, ordinary differential equations, and deterministic and stochastic algorithms. Lectures and computational assignments on the application of digital computers to problems in engineering and science.

**135. Introductory Nuclear Science and Technology** (3) I. The Staff

Lecture—3 hours. Prerequisite: Physics 121 or the equivalent. Introductory aspects of nuclear phenomena, nuclear masses, size, energy, and decay modes. Interaction of particles and electromagnetic radiation with matter. Instrumentation and theory of measurements; neutron technology. Nuclear chemistry.

**198. Group Study** (1-5) I, II, III. The Staff (Wooten in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Wooten in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**201A. Software Engineering** (3) I. Blattner

Lecture—3 hours. Prerequisite: courses 101 and 106. Development of large, production-quality programs, project management techniques, software design methodologies, computer security, and the legal aspects of software development.

**201B. Software Engineering** (3) III. Blattner

Lecture—3 hours. Prerequisite: course 201A. Automated and integrated software tools for programming environments. Small-talk environment will be studied in depth. Tools implemented by object-oriented software will be examined.

**202. Data Base Management** (3) II. The Staff

Lecture—3 hours. Prerequisite: courses 101, 103. Discussion of database models and their implementations. Course roughly divided into thirds: physical organization, logical organization, and distributed systems.

**203A. Computer Architecture** (3) I. Vemuri

Lecture—3 hours. Prerequisite: course 103 or the equivalent. Detailed design and organization of computer hardware and associated input and output devices. Topics include logic families, addressing methods, memory design, I/O devices, a survey of various architectural structures, and communication systems. A programming project will be performed.

**203B. Computer Architecture** (3) III. Vemuri

Lecture—3 hours; research paper and programming project. Prerequisite: course 203A. Topics in computer communication, hardware features to enhance operating systems, and advanced architectures.

**204A. Artificial Intelligence** (3) II. Blattner

Lecture—3 hours. Prerequisite: courses 101, 106, 111. Concepts required to understand artificial intelligence. Goal reduction, exploiting constraints, control mechanisms, and storing common sense knowledge are introduced. LISP programming language is used. Offered in even-numbered years.

**204B. Knowledge Representation** (3) III. Blattner

Lecture—3 hours. Prerequisite: courses 204A, 211, or 212. Representation of knowledge requires some language or communicative medium to describe knowledge about the world. Course explores expressive adequacy, computational efficiency, non-deductive and non-monotonic reasoning associated with some knowledge representation schemes. Offered in even-numbered years.

**204C. Rule-Based Expert Systems** (3) II. The Staff

Lecture—3 hours. Prerequisite: course 204A. Construction of rule-based interpreters. Includes knowledge representation schemes, relational model of data, inferencing strategies, control strategies, and the practical use of rule-based expert systems. Offered in odd-numbered years.

**205A. Mathematical Methods** (3) I. Killeen

Lecture—3 hours. Prerequisite: introductory courses in ordinary differential equations, vector analysis, infinite series, and functions of a complex variable. Calculus of finite and infinite dimensional vector spaces; orthonormal functions; linear equations. Applications of these analytical techniques to physical systems.

**205B. Mathematical Methods** (3) II. Killeen

Lecture—3 hours. Prerequisite: course 205A or the equivalent. Differential equations in the complex plane; contour integration; conformal mapping; Fourier and Laplace transforms; calculus of variations; applications of these techniques to physical systems.

**205C. Mathematical Methods** (3) III. Killeen

Lecture—3 hours. Prerequisite: course 205B or the equivalent. Eigenvalue problems; solution of linear differential and integral equations by expansions in orthonormal functions; Green's functions; approximation methods; applications to physical systems.

**206. Programming Languages** (3) III. The Staff

Lecture—3 hours; programming project. Prerequisite: course 106 or the equivalent. Examines topics in language design as the contour model and binding times, abstract data types, functional languages, and syntax analysis.

**207. Compiler Construction** (3) I. The Staff

Lecture—3 hours. Prerequisite: course 206. Syntax-directed translation techniques are used to implement a compiler for a block-structured, high-level programming language. Emphasis given to semantic analysis and code generation.

**208A. Operating Systems I** (3) I. The Staff

Lecture—3 hours. Prerequisite: courses 108, 203B. Design of an operating system. Emphasis given to mechanisms commonly used to implement systems and the various policy options. Course stresses the Kernel design approach.

**208B. Operating Systems II** (3) II. The Staff

Lecture—3 hours. Prerequisite: course 208A. Concentration on operating system structure, interprocess communication, and issues of naming, error control, protection, synchronization, abstract object representation and encoding, resource management, and measurement in distributed operating systems. Course integrates design goals, problems, and mechanisms.

**\*208C. Operating Systems III** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 208B. Synchronous and asynchronous models of interprocess communication; the abstract object model; distributed access control, error recovery, synchronization, naming; atomic actions; client/ server model; implementation of a distributed kernel; example distribut-

ed applications.

**209. Numerical Solutions of Partial Differential Equations** (4) I. Mirin

Lecture—4 hours. Prerequisite: courses 115, 205A, 205B, 205C. Numerical methods applicable to the solution of partial differential equations. Emphasis on finite difference methods for hyperbolic, parabolic, and elliptic systems.

**210A-210B. Advanced Methods of Computational Physics** (3-3) II-III. Killeen

Lecture—3 hours. Prerequisite: course 209 or Mathematics 228A-228B or the equivalent. Computational methods in various fields including: hydrodynamics, plasma physics, magnetohydrodynamics, Vlasov and Fokker-Planck equations, particle codes, neutron and radiation transport, chemical kinetics, and atmospheric modeling.

**211. Automata Theory and Formal Languages** (3) I. The Staff

Lecture—3 hours. Prerequisite: course 111. Relation between type (0) through type (2) languages and their respective machines (turing machine, linear bounded automata, and push down automata) is discussed. Decidability and the Halting problem discussed.

**212. Analysis of Algorithms** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 111. Investigation of time and space requirements of commonly used programming tasks, such as searching, sorting, set manipulation, and graph algorithms. NP completeness and intractability also discussed.

**213. Computer Graphics** (3) III. Max

Lecture—3 hours. Prerequisite: course 113. Development of the algorithms for producing realistic color-shaded images of three-dimensional objects.

**214. Computing with Symbolic Expressions** (3) III. The Staff

Lecture—3 hours. Prerequisite: courses 211 and 212. Theory and practice of computing with symbolic expressions. The LISP and SNOBOL programming languages. Writing programs to manipulate symbolic expressions. Algebraic manipulation. Proving the equivalence of algorithms. Survey of symbolic manipulation languages. Offered in even-numbered years.

**215A. Computational Mathematics** (3) II. Rodrigue

Lecture—3 hours. Prerequisite: course 115 or the equivalent. First course of a two-course sequence that focuses on computational methods for solving numerical problems. Emphasis is on solutions applicable to computers. Topics covered: linear systems, non-linear systems, approximation, and interpolation.

**215B. Computational Mathematics** (3) III. Rodrigue

Lecture—3 hours. Prerequisite: course 215A. Second course of a two-course sequence that focuses on computational methods for solving numerical problems. Emphasis is on solutions applicable to computers. Topics covered: optimization, integration, differentiation, and ordinary differential equations.

**216A-G Special Topics in Computer Science** (1-5) I, II, III.

Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: (A) Architecture; (B) Software Systems; (C) Language Translation; (D) Language Design; (E) Operating Systems; (F) Foundations of Computing; (G) Computational Mathematics.

**217A-217B. Computational Science** (3-3) I, II. The Staff

Lecture—3 hours. Prerequisite: courses 205A and 205B (may be taken concurrently). Designed for physical scientists. Topics in computer science with applications to computational science. Computer organization and architecture, data structures, algorithms and complexity, software environments for scientific visualization, symbolic computation.

**218A. Signal Processing** (3) I. The Staff

Lecture—3 hours. Prerequisite: Mathematics 185A, 121A-121B. Discrete-time and continuous-time signal processing. Fourier transforms, Laplace transforms, sampling and reconstruction, linear time-invariant systems, signal space concepts, and prob-

ability and random processes. Offered in odd-numbered years.

**218B. Signal Processing** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 218A. Systems and signals, convolution, causality, and stability. Z-transform, DTFT, DFT IIR, and FIR filters. Adaptive filters, array signal processing, spectral estimation, and image processing. Offered in even-numbered years.

**220. Artificial Neural Networks** (3) III. Vemuri

Lecture—3 hours. Prerequisite: Mathematics 167. Introduction to artificial neural networks. Content addressable memory, interaction, competition, and resonance. LMS and back propagation algorithms. Comparisons of standard models including perceptrons, multilayered and Hopfield nets. Supervised and unsupervised learning. Offered in even-numbered years.

**222. User Interfaces** (3) II. The Staff

Lecture—3 hours. Prerequisite: courses 101, 106. Design and evaluation of the interface between systems and users. Covers user interaction styles and techniques, display formats, user guidance, and methodologies for designing and evaluating user interfaces. Offered in odd-numbered years.

**224. Microprogramming and Microprogrammable Architecture** (3) III. The Staff

Lecture—3 hours. Prerequisite: consent of instructor. Concepts of microprogramming, design and implementation of the internal logic and data to form the hardware primitives. Survey of the architecture of commercially available, user- microprogrammable computers. Course includes a programming project on a department computer.

**227. Chaos, Fractals, and Nonlinear Dynamics** (3) III. Hoover

Lecture—3 hours. Prerequisite: course 115. Computational treatment of the mathematics of pervasive instabilities — sensitive dependence on initial conditions — called "chaos" link the Second Law of Thermodynamics to nonlinear dynamics. Strange attractors which result are generally fractal objects with great aesthetic and intellectual appeal.

**228A-228B-228C. Properties of Matter** (3-3-3) I-II-III. Hoover

Lecture—3 hours. Prerequisite: Mathematics 22B and Physics 112B. Microscopic and macroscopic descriptions of matter; thermodynamics and kinetics; constitutive, electrical, mechanical and thermal properties.

**229. Materials Science** (3) II. Hoover

Lecture—3 hours. Prerequisite: course 205C. Facts and theories of crystal defect physics and their application to such problems as the mechanical properties of solids, radiation damage, phase transformations, etc. Covers thermodynamics of point defects, diffusion, elasticity dislocation theory.

**230A-230B-230C. Structure of Matter** (3-3-3) I-II-III. The Staff

Lecture—3 hours. Prerequisite: course 205C. Classical properties of matter; introduction of quantum mechanics by the correspondence principle; perturbation theory; electron theory of atoms, molecules and solids; quantum theory of cooperative effects.

**233A-233B-233C. Theory and Applications of Solid-State Physics** (3-3-3) I-II-III. The Staff (Wooten in charge)

Lecture—3 hours. Prerequisite: course 230C or the equivalent. Structure and properties of crystals; theory of dielectrics, metals and alloys; magnetism, superconductivity, and semiconductors. Applications to various solid-state devices.

**234A-234B-234C. Electromagnetic Theory** (3-3-3) I-II-III. Newcomb

Lecture—3 hours. Prerequisite: Electrical and Computer Engineering 131B. Review basic electromagnetic field theory. Special relativity. Charges in fields. Radiation from charges: generation, scattering, diffraction. Electrodynamics of continuous media: conductors, dielectrics, superconductors, magnetic materials, plasmas. Transmission of electromagnetic waves through material. Modern applications of theory.

**235A-235B. Nuclear Physics** (3-3) II-III. The Staff  
 Lecture—3 hours. Prerequisite: course 230C. Basic properties of nuclei; radioactive decay; nuclear models; low energy nuclear reactions; neutron physics. Interaction of particles and radiation with matter.

**236. Theory of Particle Reactions** (3) II. The Staff  
 Lecture—3 hours. Prerequisite: courses 135, 230C, 234B. General theory of atomic and nuclear reactions; cross-sections for the collision of electrons, photons, and nuclear particles with atoms and/or nuclei. Decay properties by particles emission of unstable atoms or nuclei.

**255. Classical Mechanics** (3) I. Newcomb  
 Lecture—3 hours. Prerequisite: consent of instructor. General principles of analytical mechanics; variational principles; Lagrange's and Hamilton's equations; kinematics; collisions.

**256. Continuum Mechanics** (3) II. Christensen  
 Lecture—3 hours. Prerequisite: course 205C. Hydrodynamics of incompressible and compressible flows in two and three dimensions; problems of hydrodynamic instability; viscous hydrodynamics; boundary layer theory.

**257. Magnetohydrodynamics** (3) III. Newcomb  
 Lecture—3 hours. Prerequisite: course 234B. Fundamental MHD equations, MHD waves (both linear and nonlinear), shocks, Lagrangian formulation; theory of stability, gyroscopic effects, finite-resistivity effects.

**262A-262B-262C. Atomic and Molecular Interactions** (3-3-3) I-II-III. Orel  
 Lecture—3 hours. Prerequisite: course 230A-230B-230C or the equivalent. Atomic structure and spectra, molecular structure and spectra, classical and quantum mechanical collision theory of electron and heavy particle scattering.

**265A-265B. Laser Physics** (3-3) I-II. Haas  
 Lecture—3 hours. Prerequisite: courses 230A-230B-230C, 234A-234B-234C. Theory of generation of laser radiation and its interaction with matter. Dynamics of laser media, oscillators/amplifiers. Short pulse generation and propagation. Coherence properties of laser radiation. Fourier optics, resonators, and holography. Characteristics of laser devices. Laser spectroscopy.

**266A-266B. Laser Physics Laboratory** (3-3) I-II. Cameron  
 Lecture—1 hour; laboratory—6 hours. Prerequisite: course 265A-265B (may be taken concurrently). Experiments exploring principles of generation and propagation of laser radiation. Laser measurement techniques. Dynamics of laser media. Oscillators and amplifiers. Generation of short pulses. Coherence properties of laser radiation. Holography. Characteristics of laser devices. Laser spectroscopy.

**267. Nonlinear Optics** (3) III. Haas  
 Lecture—3 hours. Prerequisite: course 265A-265B. Theory of the nonlinear interaction of radiation and matter. Nonlinear optical properties of materials. Crystal optics, electro-optics, and acousto-optics. Parametric oscillation and amplification. Harmonic conversion. Stimulated Raman and Brillouin scattering, self-focusing, four-wave mixing, phase conjugation and spectroscopy.

**267L. Nonlinear Optics Laboratory** (3) III. Cameron  
 Lecture—1 hour; laboratory—6 hours. Prerequisite: course 265A-265B. Experiments exploring the principles of nonlinear optics. Phenomena studied selected from: crystal-optics, electro-optics, acousto-optics, parametric oscillation and amplification, harmonic conversion, stimulated Raman and Brillouin scattering, self-focusing, four-wave mixing, phase conjugation. Laser spectroscopy.

**280A-280B-280C. Plasma Physics and Controlled Fusion** (3-3-3) I-II-III. Hwang  
 Lecture—3 hours. Prerequisite: course 234B or 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.

**285A-285B-285C. Advanced Plasma Physics** (3-3) I-II-III. Drake  
 Lecture—3 hours. Prerequisite: courses 280A-280B-280C. Plasma kinetic theory; applications of the Fokker-Planck equation; advanced instability theory. Practical problems of plasma production and confinement. Nonlinear and relativistic effects including quasi-linear theory, relativistic beams, synchrotron radiation and laser heating of plasmas. Computer simulation of plasma phenomena.

**289A-J. Special Topics in Applied Science** (1-5) I, II, III. The Staff (Wooten in charge)  
 Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in the following areas: (A) Atomic and Molecular Physics; (B) Chemical Physics; (C) Computational Physics; (D) Computer Science; (E) Materials Science; (F) Nuclear Science; (G) Nonlinear Optics; (H) Plasma Physics; (I) Quantum Electronics; (J) Solid State. May be repeated up to a total of 5 units per segment.

**290. Seminar.** (1-2) I, II, III. The Staff (Wooten in charge)  
 Seminar—1-2 hours. (S/U grading only.)

**290C. Graduate Research Group Conference** (1) I, II, III. The Staff  
 Discussion—1 hour. Prerequisite: consent of instructor. May be repeated for credit. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (S/U grading only.)  
**299. Research** (1-12) I, II, III. The Staff (Wooten in charge)  
 (S/U grading only.)

## Upper Division Courses

**150A. Chemical Engineering Fluid Mechanics** (4)  
 II. The Staff  
 Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A, 22B, 22C, Engineering 35. Fluid statics and one-dimensional laminar flows. Kinematics of point and integral functions. The stress vector-stress tensor relation. Newton's law of viscosity and application of the Navier-Stokes equations to laminar flow and dimensional analysis. Flow of non-Newtonian fluids. Not open for credit to students who have completed Engineering 103A.

**150B. Chemical Engineering Fluid Mechanics** (4)  
 III. The Staff  
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Turbulent flows and time averaging. Application of Bernoulli's equation and the macroscopic mass, momentum, and mechanical energy balances to a variety of practical problems. Introduction to compressible flow. The entropy equation and isentropic processes. Shock waves and choke flow. Not open for credit to students who have completed Engineering 103B or Civil Engineering 141.

**151. Material Balances** (3) I. The Staff  
 Lecture—3 hours. Prerequisite: Chemistry 110A and 128B (may be taken concurrently); a working knowledge of FORTRAN. Application of principles of conservation of mass for single and multi-component systems in chemical process calculations. Studies of batch, semi-batch, and continuous processes involving mass transfer, change of phase, and chemical reaction.

**152A. Chemical Engineering Thermodynamics** (3)  
 II. The Staff  
 Lecture—3 hours. Prerequisite: course 151; Chemistry 110A. Application of principles of thermodynamics to chemical processes. Not open for credit to students who have completed Engineering 105A.

**152B. Chemical Engineering Thermodynamics** (4)  
 III. The Staff  
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 152A. Continuation of course 152A. Not open for credit to students who have completed Engineering 105B.

**153. Chemical Engineering Heat Transfer** (4) III.  
 The Staff  
 Lecture—4 hours. Prerequisite: course 150A. Steady and transient heat conduction. The thermal energy equation, analysis of forced and free convective heat transfer. Turbulence, macroscopic balances, and heat transfer coefficients. The photon transport equation and radiant energy exchange. The design of heat exchangers.

**154A. Mass Transfer** (4) I. The Staff  
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 153, Chemistry 110A. Fundamental concepts of mass transfer in fluids. Problems in pure diffusion and convective mass transfer.

**154B. Applications of Mass Transfer** (3) II. The Staff  
 Lecture—3 hours. Prerequisite: course 154A. Application of the principles of mass transfer and thermodynamic equilibrium to absorption, extraction, distillation, and other separation processes.

**155A. Chemical Engineering Laboratory** (4) I, II.  
 The Staff  
 Laboratory—12 hours. Prerequisite: course 154A. Laboratory experiments in heat, mass, and momentum transfer and in chemical kinetics.

**155B. Chemical Engineering Laboratory** (4) II, III.  
 The Staff  
 Laboratory—12 hours. Prerequisite: courses 154B, 155A. Continuation of 155A.

**156A. Chemical Engineering Kinetics** (4) II. The Staff  
 Lecture—3 hours; discussion—1 hour. Prerequisite: courses 152B, 154A; and Chemistry 110C (may be taken concurrently). Chemical kinetics and introduction to homogeneous and heterogeneous reactor design.

## Engineering: Chemical

(College of Engineering)

Brian G. Higgins, Ph.D., Chairperson of the Department

Department Office, 3092 Bainer Hall (916-752-0400)

### Faculty

Richard L. Bell, Ph.D., Professor  
 Roger B. Boulton, Ph.D., Associate Professor (*Chemical Engineering, Viticulture and Enology*)  
 Brian G. Higgins, Ph.D., Associate Professor  
 Alan P. Jackman, Ph.D., Professor  
 David F. Katz, Ph.D., Professor (*Chemical Engineering, Obstetrics and Gynecology*)  
 Benjamin J. McCoy, Ph.D., Professor  
 Karen A. McDonald, Ph.D., Assistant Professor  
 Ahmet N. Palazoglu, Ph.D., Assistant Professor  
 Robert L. Powell, Ph.D., Associate Professor  
 Dewey D.Y. Ryu, Ph.D., Professor (*Chemical Engineering, Viticulture and Enology*)  
 J. M. Smith, Sc.D., Professor Emeritus  
 Pieter Stroeve, Sc.D., Professor  
 Stephen Whitaker, Ph.D., Professor

### Courses in Engineering: Chemical

#### Lower Division Courses

- 1. The Scope of Chemical Engineering** (1) II. The Staff (Chairperson in charge)  
 Lecture—1 hour. Demonstrations and discussions of the opportunities in chemical engineering for professional development, contributions to basic knowledge, with clarification of what chemical engineers actually do in various jobs. (P/NP grading only.)
- 98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
 Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)
- 99. Special Study for Undergraduates** (1-5) I, II, III.  
 The Staff (Chairperson in charge)  
 Prerequisite: consent of instructor. (P/NP grading only.)

**156B. Chemical Engineering Kinetics** (4) III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 156A. Continuation of course 156A.

**157. Process Dynamics and Control** (4) I, III. The Staff  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 159. Fundamentals of the dynamics of linear chemical processes. Classical feedback and feed forward control of dynamic processes. Direct digital control. Laboratory experiments in process dynamics, analog and digital feedback control.

**158. Chemical Engineering Process Design** (3) III. The Staff  
Lecture—3 hours. Prerequisite: Engineering 106 (may be taken concurrently), courses 154B, 156A, 160. Chemical Engineering process design; optimization and economics.

**159. Chemical Engineering Analysis** (3) I. The Staff  
Lecture—3 hours. Prerequisite: Mathematics 22B. Chemical engineering applications of partial differential equations, tensors, systems of linear equations, and operational calculus.

**160. Design of Piping Systems and Heat Exchangers** (3) I. The Staff  
Lecture—3 hours. Prerequisite: courses 150B and 153. Design of piping systems including pumps, compressors and valves. Shortcut methods for approximating pressure drop in piping. Design of shell and tube heat exchangers.

**161. Biochemical Engineering Fundamentals** (3) III. McDonald  
Lecture—3 hours. Prerequisite: Chemistry 128A, Mathematics 22B, and Microbiology 2 or 102, or consent of instructor. Enzyme and microbial kinetics, bioreactor design and analysis, transport phenomena in bioreactors, and downstream processing.

**163. Chemical Engineering in Integrated Circuit Fabrication Technology** (4) I. The Staff  
Lecture—4 hours. Prerequisite: course 154A (concurrently); Chemistry 128B. Manufacture of semiconductor devices, integrated circuits, magnetic bubble memories, tapes and disks involving application of chemical engineering processing techniques. The chemistry and engineering of the industrial fabrication of modern circuits and devices.

**190C. Research Group Conferences** (1) I, II, III. The Staff  
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.)

**198. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

**206. Biochemical Engineering** (3) II. Ryu  
Lecture—3 hours. Prerequisite: course 161 and Microbiology 2, 3; Biochemistry and Biophysics 101A, 101B, and Food Science and Technology 205 recommended. 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 in odd-numbered years.

**226. Enzyme Engineering** (3) II. Ryu  
Lecture—3 hours. Prerequisite: Biochemistry 123 or consent of instructor; Biochemistry 133, Food Science and Technology 110A-110B, Chemical Engineering 151, Microbiology 102 recommended. 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 applica-

tion of enzymes in genetic engineering related biotechnology. Offered in even-numbered years.

**246. Advanced Biochemical Engineering** (2) III. Ryu  
Lecture—2 hours. Prerequisite: course 161, Chemical Engineering 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.

**252. Advanced Thermodynamics** (3) I. The Staff  
Lecture—3 hours. Prerequisite: course 152B or Engineering 105B. A general treatment of the first and second laws; applications of thermodynamic relationships to phase and chemical reaction equilibria; introduction to statistical thermodynamics.

**253A. Advanced Fluid Mechanics** (3) I. The Staff  
Lecture—3 hours. Prerequisite: courses 150A, 150B, and 259 (may be taken concurrently) or the equivalent. Kinematics and basic principles of fluid flow. Principles of constitutive equations. Navier-Stokes equations for Newtonian fluids. Survey of creeping flow, ideal flow and boundary layer theory. Macroscopic mass, momentum, and mechanical energy balance.

**253B. Advanced Heat Transport** (3) II. The Staff  
Lecture—3 hours. Prerequisite: courses 153 and 259 or the equivalent. Fundamental energy postulates and derivation of microscopic and macroscopic energy equations. Mechanisms of conduction. Solution to conduction problems, photon transport, black and grey body radiation and radiant exchange. Free convection equations and correlations. Forced convection.

**253C. Advanced Mass Transfer** (3) II. The Staff  
Lecture—3 hours. Prerequisite: courses 154A, 154B, and 259 (may be taken concurrently) 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.

**254. Colloid and Surface Phenomena** (4) III. Stroeve  
Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 110C. Colloid and surface phenomena occur in a wide spectrum of problems encountered in engineering and science. Introduction to the behavior of surfaces and disperse systems. Fundamentals will be applied to the solution of practical problems.

**256. Applied Kinetics and Reactor Design** (4) III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 253B, 253C. Application of kinetics and molecular transport rates to the design of chemical reactors with emphasis on heterogeneous systems.

**259. Advanced Chemical Engineering Analysis** (4) I. The Staff  
Lecture—4 hours. Prerequisite: Mathematics 22A, 22B, 22C. Applications of methods of applied mathematics to the analytical and numerical solution of partial differential equations arising in the study of momentum, heat, and mass transfer.

**260. Separation Processes: Particulate Systems** (3) I. Bell  
Lecture—3 hours. Prerequisite: course 154A. Analysis of particle systems in pollution abatement and chemical process equipment. Microorganisms, crystallization, aerosols, hydrosols, colloids. Distribution functions, population balances, rarefied gas phenomena, concentration polarization in reverse osmosis and filtration. Offered in odd-numbered years.

**261. Separation Processes: Column Operations** (3) III. McCoy  
Lecture—3 hours. Prerequisite: course 154B. Analysis and design of chemical separation processes: distillation, extraction, chromatography, adsorption. Finite difference equations, unified design methods, axial dispersion models, probability and random walk theories, method of characteristics, moment analysis,

optimization. Offered in even-numbered years.

**262. Transport Phenomena in Multiphase Systems** (3) III. Whitaker  
Lecture—3 hours. Prerequisite: course 253C. Heat, mass, and momentum transfer in multiphase, multi-component 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.

**263. Rheology and Mechanics of Non-Newtonian Fluids** (3) II. Powell  
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 in even-numbered years.

**264. Introduction to Hydrodynamic Stability Theory** (4) III. Higgins  
Lecture—4 hours. Prerequisite: course 253A. Mathematical structure for studying the stability of fluid motions. Introduction to bifurcation theory and the spectral problem for linear stability. Offered in even-numbered years.

**267. Advanced Process Control** (3) II. McDonald, Palazoglu  
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 in even-numbered years.

**290. Seminar** (1) I, II, III. The Staff  
Seminar—1 hour. (S/U grading only.)

**290C. Graduate Research Group Conference** (1) I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour. Prerequisite: consent of instructor. Research problems, progress and techniques in chemical engineering. May be repeated for credit. (S/U grading only.)

**291. Seminar in Multiphase Transport Phenomena** (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: graduate or senior standing. Seminar devoted to the theoretical and practical applications of multiphase transport phenomena. Subjects will include flow in porous media, dispersion with adsorption and reaction, and heat transfer in multiphase systems with chemical reaction. (S/U grading only.)

**292. Seminars in Process Dynamics and Control**

(1) II. Palazoglu  
Seminar—1 hour. Prerequisite: graduate or senior standing. Theoretical and practical aspects of process control will be addressed. Topics will cover controller analysis and synthesis of linear and nonlinear systems including bioreactors, distillation columns and others as well as dynamic modeling of such processes. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

### Professional Course

**390. Teaching of Chemical Engineering** (1) I, II, III. The Staff

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 twice for credit. (S/U grading only.)

## Engineering: Civil

(College of Engineering)

Chih-Kang Shen, Ph.D., Chairperson of the Department (916-752-1753)  
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### Faculty

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Daniel P. Y. Chang, Ph.D., Professor  
James A. Cheney, Ph.D., Professor  
Yannis F. Dafalias, Ph.D., Professor  
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Johannes J. DeVries, Ph.D., Adjunct Lecturer  
Leonard R. Herrmann, Ph.D., Professor  
James R. Hutchinson, Ph.D., Professor (*Graduate Adviser*)  
I.M. Idriss, Ph.D., Professor  
William K. Johnson, M.S., Lecturer  
Paul P. Jovanis, Ph.D., Associate Professor  
M. Levent Kavvas, Ph.D., Professor  
Ian P. King, Ph.D., Professor  
Ryuichi Kitamura, Ph.D., Professor  
Ray B. Krone, Ph.D., Professor Emeritus  
Bruce L. Kutter, Ph.D., Associate Professor  
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Melvin R. Ramey, Ph.D., Professor  
Karl M. Romstad, Ph.D., Professor  
Edward D. Schroeder, Ph.D., Professor  
Verne H. Scott, Ph.D., Professor Emeritus (*Civil Engineering; Land, Air and Water Resources*)  
Chih-Kang Shen, Ph.D., Professor  
Daniel Sperling, Ph.D., Associate Professor (*Civil Engineering; Environmental Studies*)  
Michael A. Taylor, Ph.D. Professor  
George Tchobanoglou, Ph.D., Professor

## Courses in Engineering: Civil

### Lower Division Courses

#### 1. The Civil Engineer in Society (1) I. The Staff (Chairperson in charge)

Lecture—1 hour. A description of the field of civil engineering and the function of the professional civil engineer. Discussion of professional practice with respect to application of engineering principles, ethics, and responsibilities. (P/NP grading only.)

#### 10. Introduction to Surveying (3) III. The Staff (Chairperson in charge)

Lecture—2 hours; laboratory—3 hours. Theory and practice of measurements for distance, elevations, and angles; the analyses and adjustments for systematic and random measurement errors; line directions, traverse computations, horizontal and vertical curves; astronomical observations and calculations for latitude, longitude, azimuth, and time. (CAN Engr 10)

#### 30. Engineering A Better Environment (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: intermediate algebra, and Physics 10 or Engineering 20. Introduction to fundamental concepts and methodologies of environmental engineering. Topics presented include water and air quality, environmental radiation and radioactivity, wastes management. Students will evaluate environmental issues in written essays and oral discussion. Intended for non-physi-

cal science majors. General Education credit: Nature and Environment/Non-Introductory.

#### 92. Internship in Engineering (1-5) I, II, III. The Staff (Chairperson in charge)

Work-learn experience. Prerequisite: lower division standing; approval of project prior to period of internship. Supervised work-study experience in civil engineering. May be repeated for credit. (P/NP grading only.)

#### 98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

### Upper Division Courses

#### 114. Probabilistic Systems Analysis for Civil Engineers (3) I, II. Kitamura

Lecture—3 hours. Prerequisite: Mathematics 21C. Probabilistic concepts and models in Civil Engineering. Statistical analysis of Civil Engineering experimental and field data. Introduction to stochastic processes models of Civil Engineering systems.

#### 131A. Structural Analysis (3) I, III. Romstad

Lecture—3 hours. Prerequisite: Mathematics 22A; Engineering 104B (may be taken concurrently). Open to Engineering students only. Elastic structural analysis of determinate and indeterminate trusses, beams, and frames. Calculation of displacements. Methods of virtual work, moment area, superposition, slope deflection, moment distribution.

#### 131B. Matrix Structural Analysis and Introduction to Finite Element (3) I. Romstad

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104B. Open to Engineering students only. Matrix formulation and computer analysis of statically indeterminate structures. Introduction to finite element methods for elasticity and bending problems.

#### 132A. Structural Design: Metallic Elements (3) II. Ramey

Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Metallic beams, columns, other members; analysis and design of bolted and welded joints; design of simple beam connections, moment resistant connections, and column base plates.

#### 132B. Structural Design: Concrete Elements (3) I, III. Taylor

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Open to Engineering students only. Elastic and ultimate strength design procedures for columns and rectangular beams, T-beams and beams of general cross-section. Building code requirements for bending, shear, axial load, combined stresses and bond.

#### 132C. Structural Design: Timber Elements (3) III. Ramey

Lecture—3 hours. Prerequisite: course 132A. Elements of timber structures and laminated structures, including connection design.

#### 133. Properties of Concrete (4) I. Taylor

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 35; senior standing. Physical and chemical properties of cements, the properties of fresh concrete, the ingredients of concrete, the desirable characteristics of hardened concrete, and how to obtain them. Mix design methods.

#### 134. Analysis and Design of Buildings (3) III. Taylor

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 131A, 132A; 132B (may be taken concurrently). Dead and live loading; earthquake and wind forces. Approximate analyses of building frames; concrete building design. Plastic analysis of metal frames.

#### 137. Construction Principles (3) III. The Staff (Chairperson in charge)

Lecture—2 hours; laboratory—3 hours. Prerequisite: senior standing in Engineering. A study of the con-

struction industry; its form, evolution, and methods of operation; fundamental principles underlying construction practices; economic factors in planning, organizing, and operating a construction force. Field trips and analysis of local construction projects.

#### 138. Earthquake Loads on Structures (3) I. Romstad

Lecture—3 hours. Prerequisite: course 131A; Engineering 102A. Determination of loads on structures due to base motions. Methods of static lateral forces, approximate dynamic analysis (response spectrum), and time history. Concepts of mass, damping, and stiffness for typical structures. Design for inelastic behavior. Consideration of wind and blast loading.

#### 139. Prestressed Concrete (3) II. Taylor

Lecture—3 hours. Prerequisite: course 132B. Principles and methods, analysis and design of sections for bending, interactive computer analysis, ultimate strength of sections. Loss of prestress, shear design. Applications to bridges, buildings, and tanks. Special materials properties needed for effective pre-stressing.

#### 140. Environmental Analysis of Aqueous Systems (3) I. Darby

Lecture—3 hours. Prerequisite: Chemistry 1B; course 140L concurrently. Introduction to principles underlying current practices in sampling and analysis of water and wastewater.

#### 140L. Environmental Analysis of Aqueous Systems Lab (1) I. Darby

Laboratory—3 hours. Prerequisite: course 140 concurrently. Introduction to laboratory practice in the examination of water and wastewater. "Wet chemical" and instrumental techniques.

#### 141. Engineering Hydraulics (3) I, III. Larock

Lecture—3 hours. Prerequisite: Engineering 103A. Open to Engineering students only. Nature of flow of a real fluid; flow in pipes; open channel flow; turbomachinery; fluid forces on objects: boundary layers, lift and drag.

#### 141L. Engineering Hydraulics Laboratory (1) I, III. Larock

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.

#### 142. Engineering Hydrology (3) I, II. Kavvas

Lecture—3 hours. Prerequisite: course 141 (may be taken concurrently), or the equivalent. Open to Engineering students only. Study of the hydrologic cycle. Frequency analysis of hydrologic variables. Precipitation analysis for hydrologic design. Evapo-transpiration, interception, depression storage and infiltration. Streamflow analysis. Flood routing through channels and reservoirs.

#### 142L. Engineering Hydrology Laboratory (1) III. Kavvas

Laboratory—3 hours. Prerequisite: course 142 (may be taken concurrently). Laboratory calculations and demonstrations of hydrologic processes, such as rainfall-runoff, storm characteristics and precipitation, evaporation and transpiration, infiltration, streamflow, and flood routing.

#### \*143. Water Resources Engineering and Management (3) II. Scott

Lecture—3 hours. Prerequisite: course 142 recommended. Engineering and management concepts affecting the planning, development, design, and operation of multipurpose projects. Consideration of water sources, data, quality and uses; policies, legislation; institutions; laws; economics; environmental concerns; and public participation.

#### 144. Groundwater Systems Design (3) I. Darby

Lecture—3 hours. Prerequisite: Engineering 5 and course 142 (may be taken concurrently); Applied Science Engineering 115 recommended. Groundwater occurrence, distribution, and movement; well-flow systems; design of wells; groundwater quality and contamination; aquifer management. Introduction to groundwater modeling.

**145. Hydraulic Structure Design** (3) III. DeVries  
Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 141, 141L, 142. Principles of project design. Methods of analysis and hydraulic design of storage systems, diversion structures, conveyance and regulation systems, and structures for irrigation, power, and flood control projects. Emphasis is on application of principles of open channel hydraulics in these systems.

**146. Water Resources Simulation** (3) II. Lund  
Lecture—3 hours. Prerequisite: course 142. Simulation techniques in the design of water resources projects; introduction to simulation theory and modeling; development and application of simulation models to surface water and groundwater problems.

**147. Solid Waste Management** (3) I. Tchobanoglou  
Lecture—2 hours; laboratory—3 hours. Characteristics and amounts of solid wastes; collection systems; introduction to waste treatment processes and return of treated wastes to the environment.

**148A. Water Quality Management** (3) II, III.  
Schroeder  
Lecture—3 hours. Prerequisite: Engineering 103A. Open to Engineering students only. Introduction to basic concepts of water quality. Fundamentals of water and wastewater treatment processes. Analysis of treatment process flowsheets. Analysis of water quality management alternatives.

**148B. Water Quality Management Systems Design** (3) III. Tchobanoglou  
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 148A (may be taken concurrently). Introduction to the design of water and wastewater treatment processes.

**149. Introduction to Air Pollution** (3) I. Carroll  
(Land, Air and Water Resources), Chang, Raabe  
Lecture—3 hours. Prerequisite: Mathematics 22B, 22C; Chemistry 1B; Atmospheric Science 121A or Engineering 103A. Examination of 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.)

**152. Introduction to Civil Engineering Planning** (3) I. The Staff  
Lecture—3 hours. Basic planning concepts; role of engineering, economic, environmental, and social information; institutional, political and legal aspects. Case studies will illustrate planning of water regulation and distribution systems, waste treatment and disposal systems, land and water transportation systems.

**153. Deterministic Optimization and Design** (3) I. Lund  
Lecture—3 hours. Prerequisite: Mathematics 21C, 22A, and Engineering 5 or the equivalent. Introduction to operations research. Optimization techniques such as linear programming, dynamic programming, and non-linear programming. Applications in water resources planning, transportation planning, systems engineering, and other civil engineering disciplines through computer-based design projects.

**160. Introduction to Transportation Planning** (3) I. Sperling  
Lecture—3 hours. Prerequisite: course 152 or consent of instructor. Historical approach to transportation planning and role of transportation in modern society. Emphasis on urban transport and mass transit. Incorporation of economic, environmental, and public service goals into transportation planning. Theory and practice in implementing transportation plans. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Geography 5.

**161. Transportation System Operations** (3) II. Jovanis  
Lecture—3 hours. Prerequisite: Engineering 102A. Principles of transportation system operations; traffic characteristics and methods of measurement; safety and operations; models of transportation operations and congestion applied to urban streets, freeways, and mass transit services.

**162. Transportation Facilities Design** (3) III. Jovanis  
Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 102A. Geometric and structural design of transportation facilities. Alignment design of travelways. Capacity and functional design of travelways and terminals. Pavement design and construction. Economics and other design considerations.

**163. Energy and Environmental Aspects of Transportation** (3) II. Sperling  
Lecture—3 hours. Prerequisite: course 160. Application of engineering, economic, and system planning concepts. Analysis of energy, air quality, and other selected environmental attributes of transportation technologies. Investigation of strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Offered in even-numbered years. (Same course as Environmental Studies 163.)

**171. Soil Mechanics** (3) I, II. Arulanandan  
Lecture—3 hours. Prerequisite: Engineering 104A (may be taken concurrently). Open to Engineering students only. Soil formations, mass-volume relationships, principle of effective stress, soil characteristics (classification and identification), compaction, capillarity and permeability, compressibility and consolidation, strength—state of stress and failure criteria.

**172. Soil Properties, Soil Behavior, and Engineering Applications** (2) I, III. Shen  
Lecture—1 hour; laboratory—3 hours. Prerequisite: courses 10 and 171 (may be taken concurrently). Laboratory studies of physical, mechanical, and hydraulic properties of soils and the use of these properties to predict the soil behavior in engineering investigation of geotechnical problems.

**173. Foundation Design** (4) II. Shen  
Lecture—4 hours. Prerequisite: courses 132B and 171. Theory of consolidation and its application to foundation design; methods of minimizing settlements and effect of settlement on structures; bearing capacity of soils; footing design; lateral earth pressures; retaining-wall design; pile and pile foundation.

**177. Soil-Water Dynamics Laboratory** (2) III. Cheney  
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 171. Laboratory experiments in current research areas in soil dynamics. Topics to vary from year to year. Examples: excavation by explosives, impact penetration in soft soils, simulated earthquakes in centrifuge models, seepage erosion in soils.

**189A-J. Selected Topics in Civil Engineering** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. Directed group study of selected topics with separate sections in (A) Environmental Engineering; (B) Hydraulics and Hydrologic Engineering; (C) Engineering Planning; (D) Geotechnical Engineering; (E) Structural Engineering; (F) Structural Mechanics; (G) Transportation Engineering; (H) Transportation Planning; (I) Water Resources Engineering; (J) Water Resources Planning. May be repeated for credit when the topic is different.

**192. Internship In Engineering** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: upper division standing; approval of project prior to the period of the internship. Supervised work-study experience in civil engineering. May be repeated for credit. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: senior standing in engineering and at least a B average. (P/NP grading only.)

**Graduate Courses**  
**201. Introduction to Theory of Elasticity** (3) I. Hutchinson  
Lecture—3 hours. Prerequisite: Engineering 104B. 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.

**202. Buckling of Columns and Plates** (3) II. The Staff  
Lecture—3 hours. Prerequisite: courses 201 and 221. Analysis of the buckling behavior of structural members: buckling of columns, lateral buckling of beams, nonlinear bending and lateral-torsional buckling of beam-columns, stability of structural frames, buckling strength and ultimate strength of plates.

**203. Inelastic Behavior of Solids: Plasticity** (3) III. Dafalias  
Lecture—3 hours. Prerequisite: course 201. Fundamentals of plasticity, the concept of yield, strain-hardening, and the associated constitutive equations for elastic-plastic solids. Solution of selected practical problems involving elastic-plastic, strain-hardening materials. Slip line field theory and limit analysis. Offered in even-numbered years.

**204. Viscous Behavior of Solids** (3) III. Dafalias  
Lecture—3 hours. Prerequisite: course 201. Fundamentals of theories of viscoelasticity and viscoplasticity for solids. Characterization of engineering materials, e.g., concrete, soil, asphalts, rubbers, etc. General analysis procedures for problems in viscoelasticity. Offered in odd-numbered years.

**205. Continuum Mechanics** (3) I. Dafalias  
Lecture—3 hours. Prerequisite: course 203 or 204. Tensor formulation of the field equations for continuum mechanics, including large deformation effects. Introduction to nonlinear elasticity and viscoelasticity. Solution of three-dimensional problems. Offered in odd-numbered years.

**211. Advanced Matrix Structural Analysis** (3) II. Romstad  
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 131A, and course 131B or consent of instructor. Computer analysis of complex frameworks by the displacement method; treatment of tapered, curved and beam on elastic foundation members; partially rigid connections; nonlinear and stability analysis; introduction to structural optimization.

**212A. Finite Element Procedures in Applied Mechanics** (3) II. Mish  
Lecture—3 hours. Prerequisite: Applied Science Engineering 115 or Mathematics 128A-128B (128B may be taken concurrently), or consent of instructor. Approximate analysis procedures; Galerkin and stationary principle methods. Construction of approximate solutions by the finite element method. Applications to one- and two-dimensional problems in engineering. Introduction to time dependent, non-linear and three-dimensional problems, and other approximation procedures.

**212B. Finite Elements: Application to Linear and Nonlinear Structural Mechanics Problems** (3) III. Herrmann  
Lecture—2 hours; laboratory—3 hours. Prerequisite: course 212A. Application of the finite element method to linear and nonlinear, one-, two-, and three-dimensional problems in continuum mechanics, soil mechanics, and to plate and shell theories.

**212C. Finite Elements: Application to Fluid Problems** (2) III. Larock  
Lecture—2 hours. Prerequisite: courses 141, 212A; additional knowledge of fluid mechanics recommended. Application of the finite element method to two- and three-dimensional fluid flow problems, including inviscid and viscous flow, convection-diffusion problems, the shallow water equations, and flow through porous media. Class lectures and independent study.

**213. Analysis of Structures Subjected to Dynamic Loads** (3) III. Romstad  
Lecture—3 hours. Prerequisite: courses 138, 211. Analysis of structures subjected to earthquake wind and blast loading; distributed, consistent and lumped mass techniques; development of a computer program for complex structures; nonlinear response spectrum analysis; frequency and time domain analysis.

**221. Theory of Plates** (3) I. Herrmann

Lecture—3 hours. Prerequisite: course 201 (may be taken concurrently). Development of plate bending theory including orthotropic behavior; application to transversely loaded, circular, and rectangular plates. Equivalent orthotropic properties for composite plates. Analytical and numerical methods for solution of plate equations.

**222. Theory and Analysis of Shells** (3) II. Hermann

Lecture—3 hours. Prerequisite: course 221. Development of membrane and bending solutions for simple shells. Slab-beam analysis of folded plates. General theory and computer analysis of complex shells.

**223. Advanced Topics in Concrete Structures** (3)

I. Taylor

Lecture—3 hours. Prerequisite: course 132B. Ductility of reinforced concrete; design for torsion of structural concrete; yield line theory for the design of concrete slabs; analysis and design of deep reinforced concrete beams.

**233. Advanced Design of Steel and Concrete Structures** (3) II. Ramey

Lecture—3 hours. Prerequisite: courses 132A, 132B, 202 (may be taken concurrently). Design considerations for column and frame buckling; design for combined biaxial bending and axial loading of concrete compression members; steel-concrete composite design; steel-plate girder design.

**240. Water Quality** (3) II. Orlob

Lecture—3 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 ground-waters; transport and fate of waterborne pollutants. Predictive methods, introduction to water quality modeling.

**242A. Air Quality** (3) III. Chang

Lecture—3 hours. Prerequisite: Engineering 105A; courses 141 and 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.

**242B. Airborne Particles and Scavenging Mechanisms** (3) I. Raabe

Lecture—3 hours. Prerequisite: Engineering 103A, 105A, courses 141, 149; or consent of instructor. Generation, characterization and behavior of small particles and droplets suspended in gas including deposition and scavenging of airborne particles in the earth's atmosphere.

**\*242BL. Airborne Particles Laboratory** (1) I. Raabe

Laboratory—3 hours. Prerequisite: course 242B (may be taken concurrently). Laboratory exercises designed to familiarize the student with methods generation and characterization of airborne particles.

**243A. Water and Waste Treatment** (3) I. Schroeder

Lecture—3 hours. Prerequisite: course 148A. Characteristics of water- and airborne-wastes; treatment processes and process kinetics; treatment system design.

**243B. Water and Waste Treatment** (3) II. Schroeder

Lecture—3 hours. Prerequisite: course 243A; consent of instructor. Continuation of course 243A.

**244. Environmental Quality Modeling** (3) III. Orlob,

Lecture—2 hours; laboratory—3 hours. Prerequisite: one from courses 240, 241, or 242A (may be taken concurrently). Mathematical modeling of environmental quality, with emphasis on mathematical models of quality, their structure, capabilities and limitations, sensitivity and reliability, as analytical and/or predictive tools.

**245. Applied Environmental Chemistry** (3) III. Darby

Lecture—3 hours. Prerequisite: Engineering 105A; Chemistry 1A, 1B, or the equivalent; courses 140 and 140L or the equivalent; Chemistry 1C, 5, or 107A recommended. Chemistry of natural and polluted waters. Chemical kinetic and equilibrium principles, thermodynamics, carbonate systems, precipitation and dissolution, coordination chemistry, oxidation reduction, and interfacial phenomena.

**246. Pilot Plant Laboratory** (3) II. Darby

Lecture—1 hour; laboratory—6 hours. Laboratory investigation of physical, chemical, and biological processes for water and wastewater treatment.

**248A. Design of Natural Systems for Wastewater Treatment** (3) III. Smith

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 243A, 243B. Procedures are presented for the design of natural aquatic and soil-based systems for treatment of municipal and industrial wastewater. Emphasis is placed on the practical application of principles developed in core courses 243A and 243B plus new information related to natural systems. Offered in odd-numbered years.

**250. Transportation Policy Planning** (3) III. Sperling

Lecture—3 hours. Prerequisite: course 152; course 160 (may be taken concurrently). Socio-technical nature of transportation. The societal, technical, and system bases for planning transportation developments. Policy framework of transportation developments and characteristics of planning process. Development of objectives, policy alternatives, and programs and factors and considerations involved in evaluations and decisions. Offered in odd-numbered years.

**251. Transportation Demand Analysis** (3) I. Kitamura

Lecture—3 hours. Prerequisite: course 114 or the equivalent. Detailed discussions of a standard procedure used in urban passenger travel demand forecasting. Principles and assumptions of the model components (trip generation, trip distribution, and modal split). Computer exercises using empirical data to calibrate models and forecast travel demand. Offered in even-numbered years.

**254. Discrete Choice Analysis of Travel Demand**

(3) II. Kitamura

Lecture—3 hours. Prerequisite: course 114 or the equivalent. 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 large-scale data sets obtained from home interview surveys.

**255. Transportation Network Analysis** (3) III. Kitamura

Lecture—3 hours. Prerequisite: course 251. Discussions of methods for the analysis of transportation network flow and network optimization. Graphs and networks, flows on networks, shortest-path algorithms, equilibrium and stochastic traffic assignment, optimum routing, optimum facility location, and optimum network design are covered. Offered in odd-numbered years.

**256. Urban Traffic Management and Control I** (3)

II. Jovanis

Lecture—3 hours. Prerequisite: graduate standing. Nature of urban vehicular traffic congestion; roadway capacity; intersection design and traffic signal operations; freeway operations and management; corridor control.

**257. Urban Traffic Management and Control II** (3)

III. Jovanis

Lecture—3 hours. Prerequisite: course 256. Microscopic and macroscopic traffic stream models; traffic signal delay models; queuing theory applications. Traffic surveillance and detection; traffic forecasting; applications to traffic control systems. Offered in odd-numbered years.

**258. Transportation Planning in Developing Countries** (3) III. Sperling

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 even-numbered years.

**259. Advanced Highway Technology and Automation** (3) I. Kitamura

Lecture—3 hours. Prerequisite: graduate standing. Technologies covered include vehicle navigation and guidance, telecommunications and information systems, and highway electrification. Analysis and evaluation of policy implementation issues, driver response and pricing strategies and costs, and formulation of control theory.

**260. Noncohesive Sediment Transportation** (3) II. The Staff

Lecture—3 hours. Prerequisite: course 141. Sediment materials. Particle suspension by currents, waves, and winds. Modes of transport. Bed load relations and suspended load relations. Calculation of total loads in streams. Similarity criteria for movable bed models. Stable channel design. Offered in odd-numbered years.

**261. Cohesive Particle Transportation** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 141. Cohesion; cohesive particulate materials; processes of aggregation and dispersion; aggregate properties; deposition and scour, channel and harbor design and maintenance. Offered in odd-numbered years.

**266A. Applied Stochastic Methods in Engineering** (3) I. Kavvas

Lecture—3 hours. Markov processes and their applications to modeling of engineering systems. Review of differential Smolukowski-Chapman-Kolmogorov equations, Brownian motion and Ornstein-Uhlenbeck processes within the framework of statistical diffusion theory and their engineering applications to pollution transport problems.

**266B. Applied Stochastic Methods in Engineering** (3) II. Kavvas

Lecture—3 hours. Stochastic differential equations and their applications to the solution of engineering problems.

**267. Water Resources Management** (3) I. Lund

Lecture—3 hours. Prerequisite: basic probability (course 114 or the equivalent) and courses 141 and 142; course 153 recommended. Operation, maintenance, and modification of existing water resource systems; engineering, economic, financial, legal, and institutional considerations; decision, optimization, and multi-objective analysis.

**268. Public Works Economics** (3) II. Lund

Lecture—3 hours. Prerequisite: Engineering 106 or Agricultural Economics 148; Economics 1A or the equivalent. Engineering economics applied to public works planning, operations, and maintenance problems; microeconomic and macroeconomic theories; benefit-cost analysis; effect of uncertainty; optimization economics; non-classical economics; public finance.

**269. Water Supply and Hydroelectric Power Planning** (3) II. Johnson

Lecture—3 hours. Prerequisite: courses 142 and 152 or the equivalent. Analysis of drought phenomena and low streamflow; water demand; risk and reliability analysis; conjunctive supply and conservation; planning alternatives. Capacity and energy determination; operations studies; planning alternatives; market requirements and load studies; analysis of system power and supply; regulatory considerations. Offered in even-numbered years.

**270. Advanced Water Resources Management** (3) III. Lund

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.

**271. Water Resources Planning Laboratory** (3) II. Johnson

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 142, 152. Application of hydrology, hydraulics, systems analysis, economics and principles of plan formulation and plan evaluation in conducting a water resources planning study. Lectures

provide instruction on principles and methodology used in the laboratory study. Offered in odd-numbered years.

**272A. Advanced Groundwater Hydrology (3) II.**

Marino

Lecture—3 hours. Prerequisite: course 144 or the equivalent; Mathematics 118A recommended. Flow in confined, unconfined, and leaky aquifers. Hydraulics of pumping and recharging wells. Identification of aquifer parameters. Groundwater quality problems.

**272B. Advanced Groundwater Hydrology (3) III.**

King

Lecture—3 hours. Prerequisite: course 272A and 212A or the equivalent. Numerical methods of fluid flow systems. Flow in the unsaturated zone. Hydrodynamic dispersion. Fresh-water and salt-water interface in coastal aquifers. Identification of regional aquifer parameters. Modeling of aquifer systems. Offered in even-numbered years.

**273. Water Resource Systems Engineering (3) I.**

Marinho

Lecture—3 hours. Prerequisite: course 153, Mathematics 131 or Statistics 131A. 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.

**274. Hydraulics of Pipe Lines (3) II. Larock**

Lecture—3 hours. Prerequisite: course 141; Engineering 5. Mechanics of liquid flow in pipes and pipe network systems. Steady flow, unsteady flow, surge and water-hammer problems. Manifold flow. Offered in even-numbered years.

**275. Hydrologic Time-Series Analysis (3) III. Kavvas**

Lecture—3 hours. Prerequisite: Engineering 118 and course 142 or the equivalent. Application of statistical methods for analysis and modeling of hydrologic series. Statistical simulation and prediction of hydrologic sequences using time series methodology. Offered in odd-numbered years.

**276. Watershed Hydrology (4) II. Kavvas**

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.

**277. Unsteady Flow in Surface Waters (3) I. King**

Lecture—3 hours. Prerequisite: course 141; Applied Science Engineering 115 (may be taken concurrently). Long waves in surface flow. Shallow water equations. Saint Venant equations. Method of characteristics. Explicit and implicit finite element methods; stability of numerical schemes. Flood routing. Bores. Dam break.

**278. Hydraulics (3) II. Larock**

Lecture—3 hours. Prerequisite: course 141. Equations for conservation of mass, momentum, energy; vorticity, circulation; stream functions, velocity potential; flows by superposition and conformal mapping; free streamline applications, gravity effects; introduction to wave motion. Offered in odd-numbered years.

**279. Advanced Mechanics of Fluids (4) I. Larock**

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 even-numbered years.

**281. Advanced Soil Mechanics (3) I. Arulanandan**

Lecture—3 hours. Prerequisite: course 171. Consolidation, shear strength and analysis of slope stability problems.

**282. Advanced Soil Mechanics Laboratory (3) II.**

Sheh

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 281. Subsurface exploration, advanced laboratory techniques including consolidation, shear

strength, pore water pressure measurement, pavement design tests, *in situ* tests. Offered in even-numbered years.

**283. Physicochemical Properties of Soils and Soil Behavior (3) I. Arulanandan**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 171. Analysis of the mechanical behavior of soils from consideration of clay mineralogy, colloidal phenomena, ion-exchange and soil-water characteristics. Laboratory includes electrical characterization of soils, optimization of electrical dispersion, and rotating cylinder tests.

**284. Theoretical Soil Mechanics (3) II. Cheney**

Lecture—3 hours. Prerequisite: course 171. Unified theory of stress-strain behavior of soil, consolidation and rate of settlement, interpretation of laboratory tests, drained and undrained strength of soil, anisotropy, and time dependent behavior.

**285. Pavement Design and Soil Stabilization (3) II. Shen**

Lecture—3 hours. Prerequisite: course 171. Principles and methods of pavement design for highway and airport pavements; purposes, principles and methods of soil stabilization in foundation engineering. Offered in odd-numbered years.

**286. Advanced Foundation Design (3) III. Shen**

Lecture—3 hours. Prerequisite: course 173. Design and analysis of bulkheads; deep excavation; tie-back systems; tunneling in soft ground; loads on buried conduits; lateral pile loading capacity; pier foundations; additional topics of footing and raft design.

**287. Dynamic Response of Soils (3) III. Idriss**

Lecture—3 hours. Prerequisite: course 171. Seismic survey, dynamic soil properties, analysis of the behavior of soils under earthquake conditions; applications to liquefaction, seismic response of soil deposits; earth dams and other structures using one-dimensional and two-dimensional analysis procedures.

**289A-I. Selected Topics in Civil Engineering (1-5) I, II, III. The Staff (Chairperson in charge)**

Lecture, laboratory, or combination. Prerequisite: consent of instructor. Directed group study of special topics with separate sections in (A) Environmental Engineering; (B) Hydraulics and Hydrologic Engineering; (C) Engineering Planning; (D) Geotechnical Engineering; (E) Structural Engineering; (F) Structural Mechanics; (G) Transportation Engineering; (H) Transportation Planning; (I) Water Resources Engineering. May be repeated for credit.

**290. Seminar (1) I, II, III. The Staff (Chairperson in charge)**

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.)

**290C. Graduate Research Group Conference (1) I, II, III. Chairperson in charge**

Discussion—1 hour. Research problems, progress, and techniques in civil engineering. May be repeated for credit. (S/U grading only.)

**298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: consent of instructor. (S/U grading only.)

**299. Research (1-12) I, II, III. The Staff (Chairperson in charge)**

(S/U grading only.)

**Professional Course**

**390. The Teaching of Civil Engineering (1) I, II, III.**

The Staff (Chairperson in charge)

Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in Civil Engineering. Participation as teaching assistant or associate-in in 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.)

## Engineering: Electrical and Computer Science

(College of Engineering)

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Rosemary Smith, Ph.D., Assistant Professor

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Ronald A. Olsson, Ph.D., Assistant Professor

Arvin Park, Ph.D., Assistant Professor

Manfred G. Ruschitzka, Ph.D., Professor

Richard F. Walters, Ph.D., Professor

## Courses in Engineering:

### Electrical and Computer Science

(Courses in Electrical and Computer Science Engineering are listed below; courses in Computer Science Engineering are listed immediately following.)

#### Lower Division Courses

##### 1. Introduction to Electrical and Computer Engineering (1) III. The Staff (Chairperson in charge)

Lecture—1 hour. Electrical and computer engineering as a professional activity. What electrical engineers know and how they use their knowledge. Problems they are concerned with and how they go about solving them. Presentation of basic ideas and their applications. Examination of some case studies. (P/NP grading only.)

##### 70. Computer Structure and Assembly Language (4) I, II, III. Matioff, Redinbo

Lecture—3 hours; computer workshop—3 hours. Prerequisite: proficiency in at least one high-level programming language. Introduction to 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.

##### 89A-U. Special Topics in Electrical Engineering and Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)

Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science, (B) Programming Systems, (C) Digital Systems, (D) Communications, (E) Signal Transmission, (F) Digital Communication, (G) Control Systems, (H) Robotics, (I) Signal Processing, (J) Image Processing, (K) High-Frequency Phenomena and Devices, (L) Solid-State Devices and Physical Electronics, (M) Systems Theory, (N) Active and Passive Circuits, (O) Integrated Circuits, (P) Computer Software, (Q) Computer Engineering, (R) Microprocessing, (S) Electronics, (T) Electromagnetics, (U) Opto-Electronics. May be repeated for credit when the topic is different.

##### 92. Internship in Electrical and Computer Engineering (1-5) I, II, III. The Staff (Chairperson in charge)

Work-learn experience—3-15 hours. Prerequisite: lower division standing; project approval prior to period of internship. Supervised work-study experience in Electrical and Computer Science Engineering. May be repeated for credit. (P/NP grading only.)

##### 98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

##### 99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

#### Upper Division Courses

##### 110A. Electronic Circuits (3) II. Spencer, Haley, Hurst

Lecture—3 hours. Prerequisite: courses 70, 112, 140A, Engineering 100; course 111A concurrently; course 140B concurrently recommended. Large and small signal device models; analysis and design of bias and gain stages; analysis and design of op amps.

##### 110B. Electronic Circuits (3) III. Spencer, Haley, Hurst

Lecture—3 hours. Prerequisite: courses 110A, 111A, 112; course 111B concurrently; course 140B recommended. Analysis and design of multi-stage and feedback amps; op-amp limitations and applications; active filters; oscillators; digital switches.

##### 111A. Electronic Circuits Laboratory (1) II.

Spencer, Hurst

Laboratory—3 hours. Prerequisite: courses 112, 140A, Engineering 100; course 110A concurrently; course 140B concurrently recommended. Design, analysis, and evaluation of transistor circuits, amplifiers, and op-amps.

##### 111B. Electronic Circuits Laboratory (1) III.

Spencer, Hurst

Laboratory—3 hours. Prerequisite: courses 110A, 111A, 112; course 110B concurrently; course 140B recommended. Design, analysis and evaluation of multi-stage and feedback amps, oscillators and switching circuits.

##### 112. Linear Systems and Circuits (4) I. Abdel-Ghafar, Levy, Ford, Chang

Lecture—4 hours. Prerequisite: Engineering 17; Mathematics 22A. Characterization and analysis of linear systems and circuits. Time domain analysis by convolution techniques. Emphasis on frequency domain techniques, including Laplace transform, Fourier transform and Fourier series, with applications to electrical circuits.

##### 114. Analog Integrated Circuits (3) I. Hurst, Spencer, Current

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 110B, 111B, 140B. Analysis and design of analog integrated circuits. Emphasis is on bipolar transistor circuits. Single-stage amplifiers, cascaded amplifier stages, current sources, differential pair, frequency response, and feedback amplifiers. (Former course 114A)

##### 118. Digital Integrated Circuits (3) II. Hurst, Current

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110B, 111B, 140B. Analysis and design of digital integrated circuits. Emphasis is on MOS logic circuit families. Logic gate construction, voltage transfer characteristics, and propagation delay. Regenerative circuits, RAMs, ROMs, and PLAs. (Former course 114B.)

##### 130A. Introductory Electromagnetics (3) II. Dienes, Fink, Knoesen

Lecture—3 hours. Prerequisite: Mathematics 22B and 22C; Physics 9C strongly recommended. Static electric and magnetic fields; time-varying electromagnetics.

##### 130B. Introductory Electromagnetics (3) III. Fink, Dienes, Knoesen

Lecture—3 hours. Prerequisite: course 130A and Engineering 17. Plane electromagnetic waves, transmission, reflection. Transmission lines. Not open for credit to students who have completed course 139.

##### 131A. Electromagnetic Fields and Waves (3) I. Fink, Dienes

Lecture—3 hours. Prerequisite: course 130B or the equivalent. Propagation and reflection of plane waves in isotropic media. Guided electromagnetic waves. Rectangular and circular wave guides.

##### 131B. Electromagnetic Fields and Waves (3) II. Fink, Dienes

Lecture—3 hours. Prerequisite: course 131A or the equivalent. Fiber optics. Helix and slow-wave structures. Wave propagation in media with anisotropic permittivity and permeability, and on plasmas. Traveling wave amplifier.

##### 131C. Electromagnetic Fields and Waves (3) III. Fink, Dienes

Lecture—3 hours. Prerequisite: course 131B or the equivalent. Resonant cavities; microwave networks and components; antennas.

##### 132A. High-Frequency Systems, Circuits and Devices (4) I. Branner

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 130B. Application of electromagnetic theory to analysis and design of practical devices, circuits and systems operating at radio frequencies. Energy transfer at high frequencies, transmission lines, microwave integrated circuits, circuit analysis of electromagnetic energy transfer systems, the scattering parameters.

##### 132B. High-Frequency Systems, Circuits and Devices (4) II. Branner

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 132A. Passive high frequency device analysis, design. Microwave circuit and filter design. Introduction to analysis and design of microwave transistor and tunnel diode amplifiers.

##### 134. Radar Systems and Signals (3) III. Branner

Lecture—3 hours. Prerequisite: course 112; course

160 strongly recommended. Introductory course on radar systems and signals. Emphasis on analysis of practical radar system configurations and signals. The prediction of radar range performance, accuracy and resolution is discussed for a number of radar classes including: pulse, cw and pulse doppler.

##### 135. Optical Communications I: Fibers (3) III.

Dienes, Knoesen

Lecture—3 hours. Prerequisite: course 130B or 139. Principles of optical communication systems. Dispersion broadening of pulses. Planar dielectric guides. Optical fibers: single-mode, multi-mode, step and graded index. Attenuation and dispersion limitations. Design of zero dispersion fibers. Offered in odd-numbered years.

##### 139. Fields and Waves for Computer Majors (4) III.

Dienes, Fink

Lecture—4 hours. Prerequisite: Mathematics 22B, 22C; Physics 9C. Static electric and magnetic fields. Electromagnetic waves and transmission lines. Not open for credit to students who have completed course 130B.

##### 140A. Fundamental Principles of Device Physics (3) I. Bower, Churchill, Haley, Hunt, Kowal

Lecture—3 hours. Prerequisite: Physics 9C. Semiconductor device fundamentals, equilibrium and non-equilibrium statistical mechanics, conductivity, diffusion, density of states, electrons and holes, p-n junctions, Schottky junctions, and junction field effect transistors.

##### 140B. Fundamental Principles of Device Physics (3) II. Bower, Churchill, Haley, Hunt

Lecture—3 hours. Prerequisite: course 140A. Electrical properties, design, and models for Bipolar and MOS devices.

##### 145A. Solid-State Electronics (3) III. Bower, Churchill, Haley, Kowal, Soohoo, Hunt

Lecture—3 hours. Prerequisite: course 140B. Physical properties of electronic materials.

##### 145B. Solid-State Electronics (3) I. Churchill, Soohoo, Haley, Hunt, Kowal

Lecture—3 hours. Prerequisite: course 145A. Magnetic properties of solids. Design of devices and their associated circuits utilizing the magnetic properties of solids. Devices studied include the ferrite core, ferrite isolator, magnetic media used in disk, tape, and bubbles and masers.

##### 146A. Integrated Circuits Fabrication (3) I. Hunt, Bower

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 140B. 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. (Formerly course 115A.)

##### 146B. Advanced Integrated Circuits Fabrication (3) II. Hunt, Bower

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 146A. Fabrication processes for CMOS VLSI. Lab 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. (Former course 115B.)

##### 148. Superconductivity (3) III. Fink

Lecture—3 hours. Prerequisite: course 130B or 140B. Fundamental properties of superconductors of the first and second kind, London and Ginzburg-Landau theories, Josephson effects, applications and devices.

##### 150. Microprocessor-Based Instrumentation Systems (4) III. Soderstrand

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 70 and Engineering 100. Typical uses of microprocessors and microprocessor development systems in instrumentation applications. Analytical and design methods common to modern instrumentation systems including: transducers, dynamic

response, signal conditioning, A/D conversion, data transmission, hardware interfacing, software development, noise and safety.

**151. Discrete Time Systems** (3) I. Hsia, Ford, Mayne, Wang

Lecture—3 hours. Prerequisite: course 112. Characterization, analysis, and design of discrete time systems. Difference equation models. Z-transform analysis methods. Introduction to digital filter design. Discrete and fast Fourier transforms.

**152. Feedback Design of Uncertain Systems** (3) I. Horowitz

Lecture—3 hours. Prerequisite: course 112. Quantitative design of feedback systems to achieve prescribed performance tolerances despite large uncertainties in system parameters and competing disturbance inputs. Application to single input-output, linear time invariant, time varying and nonlinear systems. Minimization of the cost of feedback.

**157A. Control Systems** (3) II. Hsia, Dorf, Wang, Chang

Lecture—3 hours. Prerequisite: course 112. Design and analysis of closed loop automatic control systems. Examples are drawn from all engineering fields. The mathematical representation of systems; frequency, s-plane and state space methods; stability criteria.

**157B. Control Systems** (3) III. Hsia, Dorf

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 157A. Control system optimization and compensation techniques, digital control theory. Laboratory includes Servo system experiments and computer simulation studies.

**160. Signal Analysis and Modulation** (3) I, III.

Algazi, Feher, Ford, Gardner, Levy

Lecture—3 hours. Prerequisite: course 112. Signal analysis based on Fourier methods. Fourier series and transforms; time-sampling, convolution, and filtering; autocorrelation and spectral density; modulation: carrier-amplitude, carrier-frequency, and pulse-amplitude.

**161. Signal Processing** (3) II. Ford

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 151, 160; Engineering 100. Design and implementation of analog and digital signal processing systems. Topics include: filtering, spectral analysis, function circuits, A/D and D/A conversion, and digital communication systems.

**165. Modulation, Coding, and Noise** (3) II. Algazi, Ford, Gardner, Levy

Lecture—3 hours. Prerequisite: course 160; Statistics 120. Introduction to random process models of modulated signals and noise, and analysis of receiver performance. Analog, carrier, and digital pulse modulation. Signal-to-noise ratio, probability of error, matched filters, and Wiener filters. Introduction to information theory and coding.

**166. Digital Communications: Satellite, Microwave, Cable** (3) III. Feher

Lecture—3 hours. Prerequisite: course 160. Introduction to digital communications by satellite, microwave, and cable systems. Baseband signal processing techniques for digital MODEMS (modulators-demodulators). Principles and applications of QPSK, 64-QAM, and other MODEMS in TDMA and SCPC satellite and terrestrial microwave systems.

**167. Telecommunications Measurements and Instrumentation** (3) III. Feher

Lecture—3 hours. Prerequisite: course 160. Measurements and instrumentation for digital communications and signal processing systems. Analysis of bit error rate, noise and jitter measurement uncertainties. Digitized PCM voice and video spectral and time measurements. Expert (artificial intelligence) applications. In-class experiments/ demonstrations.

**171. Introduction to Computer Architecture** (4) I, II, III. Park, Redinbo

Lecture—3 hours; discussion—1 hour. Prerequisite: course 70. Study of the interrelationship and interaction of various parts of computer systems including instruction sets, processing and control units, particularly microprogrammed control units, buses, input-

output, arithmetic and logic processing, and memory system hierarchies.

**172. Microcomputer-Based System Design** (4) I, II, Lin

Lecture—2 hours; laboratory—6 hours. Prerequisite: courses 70, 176; course 177 (concurrently) recommended. 8086/8088 microprocessor architecture; bus-based system architecture; peripheral chips architecture; I/O interface design; interrupt driven system design; general system design procedure; MS-DOS operating system; comparison of different types of microprocessors.

**175. Computer Devices and Systems** (3) III. Soohoo

Lecture—3 hours. Prerequisite: course 140B. Characteristics and design of the essential components of a computer. Design of I/O, storage, memory, logic, and control units using devices with realistic rather than idealized characteristics emphasized. Advantages and disadvantages of alternative realizations are considered.

**176. Digital Systems I** (4) II, III. Lin

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 100. Introduction to digital system design including combinational logic design, sequential and asynchronous circuits, computer arithmetic, memory systems and algorithmic state machine design.

**177. Digital Systems II** (4) I, III. Lin

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 110A-110B, 176. Multi-input/output sequential digital systems; time/pulse circuits; TTL, CMOS, ECL logic elements; analog switch; sample/hold; A-D-A converters design; system noise; grounding, shielding, cross-talk, reflection; memory systems; CAD with PLD/PAL.

**182A. Operating System Design** (4) I. Ruschitzka

Lecture—3 hours; programming workshop—3 hours. Prerequisite: course 171. Architectural support of operating system concepts; systems programming; major components of an operating system, their functions, and their interactions. Lecture material coupled with programming project that involves a machine simulator and the implementation of matching multiprogramming system.

**182B. Operating System Design** (3) II. Ruschitzka

Lecture—3 hours. Prerequisite: course 182A; introductory probability theory course. Contemporary architectures: virtual memory and operating system support functions. Concurrent processes and problems of determinacy, mutual exclusion, deadlocks, and synchronization; management of physical and virtual resources. Protection mechanisms. User interface and ease-of-use considerations.

**189A-U. Special Topics in Electrical Engineering and Computer Science** (1-5) I, II, III. The Staff (Chairperson in charge)

Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science; (B) Programming Systems; (C) Digital Systems; (D) Communications; (E) Signal Transmission; (F) Digital Communication; (G) Control Systems; (H) Robotics; (I) Signal Processing; (J) Image Processing; (K) High-Frequency Phenomena and Devices; (L) Solid-State Devices and Physical Electronics; (M) Systems Theory; (N) Active and Passive Circuits; (O) Integrated Circuits; (P) Computer Software; (Q) Computer Engineering; (R) Microprocessing; (S) Electronics; (T) Electromagnetics; (U) Opto-Electronics. May be repeated for credit when topic is different.

**190C. Research Group Conferences In Electrical and Computer Engineering** (1) I, II, III. The Staff

Discussion—1 hour. Prerequisite: upper division standing in Electrical and Computer Science Engineering; consent of instructor. Research group conferences. May be repeated for credit. (P/NP grading only.)

**192. Internship In Electrical and Computer Engineering** (1-5) I, II, III. The Staff (Chairperson in charge)

Work-learn experience—3-15 hours. Prerequisite: completion of a minimum of 84 units; project

approval prior to period of internship. Supervised work-study experience in electrical and computer engineering. May be repeated for credit. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

**Graduate Courses**

**201. Digital Processing of Signals** (4) II. Algazi, Friedlander, Ford

Lecture—4 hours. Prerequisite: course 151. Theory and applications of digital processing of signals. Z-transform analysis of discrete-time systems, filter design techniques, structures for discrete-time systems, discrete Fourier transform, and Hilbert transforms. (Former course 204.)

**205. Introduction to Optical Information Processing** (3) II. Kowal

Lecture—3 hours. Prerequisite: courses 230 and 250 recommended. Review of the scalar theory of diffraction and of two-dimensional Fourier transforms, from which the foundations of the frequency analysis of imaging systems will be developed. Image processing techniques will be examined, including the theory and application of holography. Introduction to optical computing.

**206. Digital Image Processing** (4) II. Algazi, Ford

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 151. Two-dimensional systems theory, image perception, sampling and quantization, transform theory and applications, enhancement, filtering and restoration, image analysis, and image processing systems.

**207. Pattern Recognition and Classification** (3) III. Ford

Lecture—3 hours. Prerequisite: Statistics 131A or Mathematics 131, or the equivalent. Topics in statistical pattern recognition: Bayes decision theory; parameter estimation and supervised learning; non-parametric techniques; linear discriminant functions; unsupervised learning and clustering; feature extraction. Applications to image processing.

**208. Image Analysis and Computer Vision** (3) III. Algazi, Levy

Lecture—3 hours. Prerequisite: course 151. Geometry of two-dimensional objects. Edge detection and image segmentation. Image formation and fundamental principles of computer vision. Recovery of three-dimensional structure from shading or stereo information. Analysis of motion and estimation of motion parameters. Geometry and representation of three-dimensional objects.

**210. Analog Circuit Design** (3) I. Spencer, Current, Hurst

Lecture—3 hours. Prerequisite: courses 110A-110B, 111A-111B, and 140B. Analysis and design of amplifiers, bias circuits, voltage references and other analog circuits. Feedback and compensation of linear amplifiers. Computer-aided analysis is used extensively.

**211. Advanced Analog Circuit Design** (3) II. Spencer, Current, Hurst

Lecture—3 hours. Prerequisite: course 210; Statistics 131A or the equivalent recommended. Noise in electronic circuits and systems. Distortion analysis; the translinear principle and its application to circuit analysis and synthesis; phase-locked loops and their applications.

**212. Analog MOS IC Design** (3) III. Hurst, Spencer, Current

Lecture—3 hours. Prerequisite: course 210 or 114A and consent of instructor. Analysis and design of analog MOS integrated circuits. CMOS process, MOS device modeling, passive components, single stage amplifiers, current sources, op amps, compensation, comparators, switched-capacitor filters, and analog-to-digital converters.

**214A. Computer-Aided Circuit Analysis and Design** (3) I. Haley, Current

Lecture—3 hours. Prerequisite: courses 110A-110B, 111A-111B; knowledge of FORTRAN or C. Network equation formulations; nonlinear dc and linear ac circuit analysis. Calculation of dc and ac network sensitivities. Extensive computer project.

**214B. Computer-Aided Circuit Analysis and Design (3) II.** Current, Haley

Lecture—3 hours. Prerequisite: course 214A. Transient (time-domain) analysis; harmonic analysis; steady-state analysis; time-domain network sensitivities, ac, dc, transient gradient calculations, design optimization. Extensive computer project.

**218A. Introduction to VLSI Circuits (3) I.** Current, Hurst, Spencer

Lecture—3 hours. Prerequisite: courses 110A-110B, 111A-111B. Theory and practice of VLSI circuit and system design. Extensive use of VLSI computer-aided design aids allows students to undertake a VLSI design example.

**218B. Multiproject Chip Design (1) II.** Current, Hurst, Spencer

Laboratory—3 hours. Prerequisite: course 218A. CMOS and NMOS multiproject chip layouts of projects begun in courses 218A, 212, and 219 are assembled and submitted to the DARPA/NSF MOSIS program for fabrication.

**218C. IC Testing and Evaluation (1) III.** Current, Hurst, Spencer

Laboratory—3 hours. Prerequisite: course 218B. Chips submitted in course 218B are tested and evaluated. Issues involving design of ICs for testability are discussed.

**219. Advanced Digital Circuit Design (3) III.** Hurst, Current, Spencer

Lecture—3 hours. Prerequisite: course 114B 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. Mutivalued logic.

**220. Semiconductor Devices (3) III.** Churchill, Bower, Hunt

Lecture—3 hours. Prerequisite: course 140B. Covers the physical principles, characteristics and models of various semiconductor devices including: P-N Junction and metal-insulator-semiconductor diodes, junction and insulated gated field effect transistors.

**221. Passive Filter Design (3) I.** Soderstrand, Current, Haley

Lecture—3 hours. Prerequisite: Engineering 100 and course 112 or the equivalent. Introduction to the design of passive filters with lumped and distributed elements. Filter specification and design process, approximation theory, modern doubly terminated reactance, two-port synthesis, passive filters with lumped elements, crystal and ceramic filters, mechanical filters.

**222. Active Filter Design (3) II.** Soderstrand, Current, Haley

Lecture—3 hours. Prerequisite: course 221 recommended. Introduction to the design of active filters with lumped elements and switches. Active filters with lumped RC elements, active-R networks, and switched capacitor filters.

**225. RF Amplifiers, Oscillators, Mixers, and Antennas (4) III.** Branner

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 132B and consent of instructor. 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. Analysis and design of linear, loop, waveguide, and horn radiators.

**226A. Quantum Electronics (3) II.** Dienes, Fink

Lecture—3 hours. Prerequisite: courses 130B and 140B. Some basic concepts of quantum theory, density operator, Hamiltonian, and parity. Electric dipole transition; equation of motion of magnetic dipole; resonant processes, absorption, dispersion and saturation; transient behavior of electric dipole transitions, coupled amplitude equations and rate equations. Offered in even-numbered years.

**226B. Quantum Electronics (3) III.** Dienes, Fink

Lecture—3 hours. Prerequisite: course 226A. Lasers, masers: population inversion, threshold requirement, steady-state and transient behavior, Q-switching. Interaction between radiation and phonons. Offered in odd-numbered years.

**227A. Microwave Electronics (3) I.** Soohoo

Lecture—3 hours. Prerequisite: courses 130B and 140B. Theory of microwaves, waveguides and cavities. Interaction between electromagnetic fields and the electron charge. Lorentz force law, energy levels in matter and Zeeman splitting. Comparison between conventional and microwave tubes and other new types of microwave oscillators and amplifiers. Offered in odd-numbered years.

**227B. Microwave Electronics (3) II.** Soohoo

Lecture—3 hours. Prerequisite: course 227A or the equivalent. Theory of interaction between electromagnetic fields and electronic charge, with applications to electron beam and solid-state devices. Beam formation, velocity and density modulation, plasma oscillation, space charge wave propagation in klystrons. Parametric amplifiers, tunnel and IMPATT diodes, Gunn oscillators. Offered in even-numbered years.

**228. Advanced Microwave and Antenna Design Techniques (3) III.** Branner

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 132B or 131B, 221. Design, fabrication, analysis of advanced microwave devices, antennas. Includes FET amplifiers, broadband microstrip and stripline filters, hybrids, beamformers, tapered networks. Youla's broadband matching theory applied to microwave devices. Antenna design, analysis of horns, microstrip, log periodic, arrays, spirals and reflectors.

**230. Electromagnetics (3) I.** Fink, Dienes

Lecture—3 hours. Prerequisite: course 130B. Maxwell's equations, plane waves, reflection and refraction, waveguides, waves in anisotropic media, propagation in dispersive media, laser beams and resonators.

**231. Electromagnetic Theory (3) II.** Dienes, Fink

Lecture—3 hours. Prerequisite: course 131B; Applied Science Engineering 234A. Advanced topics in electromagnetics, including propagation in anisotropic and nonlinear media.

**232. Advanced Applied Electromagnetics (3) II.** Branner

Lecture—3 hours. Prerequisite: course 131B or 132B. Exact formulation of applied electromagnetic problems by using Green's functions. Applications of these techniques to transmission circuits.

**240. Quantum Mechanics (3) I.** Kowal, Churchill, Haley

Lecture—3 hours. Quantum dynamics of particles and waves. Schrodinger's equation, tunneling, angular momentum, atomic structure and bonding, perturbations, one-dimensional band-theory of solids, interaction of matter with radiation, photons.

**245A. Applied Solid-State Physics (3) II.** Fink, Soohoo, Churchill, Kowal, Haley, Hunt

Lecture—3 hours. Prerequisite: course 140B. Physics of solids relevant to solid-state applications. Topics include conduction mechanisms in semiconductors and transport phenomena in semiconductors, and polarization and magnetism in solids.

**245B. Applied Solid-State Physics (3) III.** Churchill, Soohoo, Haley, Kowal, Hunt

Lecture—3 hours. Prerequisite: course 245A or the equivalent. Theory of semiconductors with application to transistors. Topics include transport and recombination of excess carriers and semiconductor devices.

**245C. Applied Solid-State Physics (3) III.** Fink, Soohoo

Lecture—3 hours. Prerequisite: course 245A. Theory of magnetism in solids, with application to ferromagnetic devices and circuits. Topics include paramagnetism, ferromagnetism, magnetic resonance, and switching properties of individual magnetic elements and magnetic arrays.

**246. Advanced Projects in IC Fabrication (3) III.**

Current, Hunt, Spencer

Discussion—1 hour; laboratory—6 hours. Prerequisite: course 146B. Individualized projects in the fabrication of analog or digital integrated circuits. (Former course 215.)

**247. Advanced Semiconductor Devices (3) I.**

Churchill, Bower, Hunt

Lecture—3 hours. Prerequisite: course 220. Physics of various semiconductor devices, including metal-oxide-semiconductor field-effect transistors (MOSFETs), IMPATT and related transit-time diodes, transferred-electron devices, light-emitting diodes, semiconductor lasers, photodetectors, and solar cells.

**248. Microsensor Design and Fabrication (3) III.**

Smith, Bower

Lecture—3 hours. Prerequisite: graduate standing in Engineering. Design and fabrication of sensors using microfabrication techniques. Topics include transduction principles, fabrication technologies specific to microsensors, and design of microsensor systems, including packaging. Offered in even-numbered years.

**249. Microfabrication (3) III.** Hunt

Lecture—3 hours. Prerequisite: graduate standing in Engineering. Theory and practices of several major technologies of microfabrication, used for producing integrated circuits, sensors, and microstructures. Major topics include sputtering, chemical vapor deposition, plasma processing, micromachining, and ion implantation. Offered in odd-numbered years.

**250. Linear Systems and Signals (4) I.** Wang, Chang, Levy, Gundes

Lecture—4 hours. Prerequisite: course 112. Review of linear algebra. Mathematical description of systems. Solution of the state equations and an analysis of controllability, observability, realizations, state feedback and state estimation. Introduction to discrete-time signals and system, and the Z-transform.

**251. Nonlinear Control Systems (3) II.** Horowitz

Lecture—3 hours. Prerequisite: course 152. Feed-back systems with uncertain nonlinear plants; techniques for achieving performance tolerances; single input-single output (SISO) and multiple input-multiple output (MIMO); cost of feedback; dithered adaptive systems.

**252. Multivariable Control System Design (3) II.**

Mayne, Wang

Lecture—3 hours. Prerequisite: course 250. Review of single-loop feedback design. Stability, performance and robustness of multivariable control systems. LQG design. H<sub>∞</sub> design. Frequency response methods. Optimization-based design.

**253. Adaptive Systems (3) I.** Hsia

Lecture—3 hours. Prerequisite: courses 151, 250 or the equivalent. Theory and practice of adaptive systems. Concepts of learning and adaptation. Structure of adaptive system and the related adaptive algorithms. Applications to adaptive filters design, system identification, and adaptive control.

**254. Digital and Sampled-Data Control System (3) II.** Hsia, Chang

Lecture—3 hours. Prerequisite: courses 157A, 250 or the equivalent. Major topics in digital and sampled data control theory with applications to computer control system analysis and design. Frequency domain (z-transform) methods, state space methods and statistical design methods. Offered in even-numbered years.

**255. Robotic Systems (3) I.** Hsia, Wang

Lecture—3 hours. Prerequisite: courses 112 and 157A. Introduction to robotic systems. Mechanical manipulators, kinematics, manipulator positioning and path planning. Dynamics of manipulators and optimal control. Computer vision and visual feedback, robot motion programming, and control algorithm design.

**258. Optimization Techniques with Applications (3) II.** Wang

Lecture—3 hours. Prerequisite: knowledge of FORTRAN or C and graduate status. Computer-aided optimization of single-variable and multi-variable

functions with and without constraints. Sequential search methods. Gradient methods. Linear and nonlinear programming. Typical applications in different disciplines.

**259. Optimization of Dynamic Systems (3) III.**

Chang

Lecture—3 hours. Prerequisite: course 250. Introduction to dynamic system optimization techniques with applications. Calculus of variations, maximum principle, dynamic programming. Applications to various optimization problems in system engineering.

**260. Random Signals and Noise (4) II.** Gardner

Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 120, course 160; 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.

**262. Spectral Analysis (4) III.** Gardner

Lecture—3 hours; discussion—1 hour. Prerequisite: undergraduate course on linear systems and Fourier analysis (e.g., courses 112 and/or 160). Theory and methodology of empirical spectral analysis of random signals. Fundamentals of resolution, leakage, and reliability. Analog and digital methods. Parametric modeling and nonparametric methods. Cross-spectral analysis. Applications to detection and estimation.

**263. Optimal and Adaptive Filtering (3) III.** Gardner, Levy, Friedlander

Lecture—3 hours. Prerequisite: course 260. Geometric foundation for mean-square estimation problems. Theory and applications of optimum Wiener filtering, optimum Kalman filtering, and adaptive estimation.

**264. Estimation and Detection of Signals in Noise (4) III.** Gardner

Lecture—3 hours; discussion—1 hour. Prerequisite: course 260. Introduction to parameter estimation and detection 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.

**266. Information Theory and Coding (3) III.** Algazi, Abdel-Ghaffar

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. Linear block and convolutional codes.

**267. Digital Communications Engineering (3) I.** Feher

Lecture—3 hours. Prerequisite: course 260. Concepts and system configurations. Principles and design of data transmission systems. Optimum transmitters/receivers for digital baseband and modulation systems. Design and application of QPSK, QAM, QPRS and of error correction codes in ISDN satellite, microwave, and cable systems.

**268. Advanced Digital Modulation Techniques (3) II.** Feher

Lecture—3 hours. Prerequisite: courses 260 and 267. MODEM (modulator-demodulator) and signal-processing subsystem analysis, design and application for digital satellite, microwave, mobile radio and cable systems. Study of correlative/coded modems, computer-aided and hardware design of advanced communications and synchronization systems.

**270. Computer Architecture (3) II.** Matloff

Lecture—3 hours. Prerequisite: course 171 and Statistics 131A. Emphasis on quantitative analysis of design tradeoffs, optimization of resource usage, formal descriptive models, and interactions between architecture and software.

**271. Advanced Digital System Design (4) II.** Lin

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 177. Topics in advanced design of arithmetic processors. High-speed addition, multiplication, and division. Floating point processors. Pipeline pro-

cessors. Laboratory involving design and construction of several example systems.

**272. Advanced Switching Theory (3) III.** The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: course 171 and Computer Science Engineering 100. Topics in switching theory. Synchronous and asynchronous sequential circuits. Theoretical study of Boolean functions and their transforms. Special realization techniques for combinational and sequential circuits.

**273. Bit-Slice Microprocessor Systems (3) III.** Lin

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 172 and 177. Literature search and comparison of the most popular bit-slice microprocessors. Microprogramming technique for the design of control unit of CPU; microprogram control technique and state machine concept for digital logic design; hardware emulation of microprocessor/microcomputer.

**274. Parallel Computer Architectures (3) III.** Matloff

Lecture—3 hours. Prerequisite: course 270. Use of parallelism to achieve high performance levels. Within-CPU parallelism, through pipelining. Multiple-CPU parallelism, through array processors and multiprocessors, and through novel structures such as dataflow machines. Current research.

**275. The Design and Analysis of Digital Sequential Machines (3) III.** Redinbo

Lecture—3 hours. Prerequisite: Computer Science Engineering 100. Study of finite-state sequential machine design, models and behavior; minimal and equivalent realizations; incompletely specified machines; serial and parallel decompositions; partition algebras; loop free structures; regular expressions; linear sequential systems; controllability and observability; Turing machines; semigroups and machines.

**276A. Introduction to Fault-Tolerant Computing (3) III.** Redinbo

Lecture—3 hours. Prerequisite: course 176. Examination of current issues in design and analysis of fault-tolerant digital systems. Course covers basic fault-tolerant architectures such as NMR, Hybrid, and Fail-Soft as well as reliability analysis, system diagnosis, and software fault-tolerance.

**276B. Introduction to Digital Fault Diagnosis (3) I.** Redinbo

Lecture—3 hours. Prerequisite: course 176; Engineering 118. 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.

**277. Real-Time Multiprocessor/Multitasking System Design (5) III.** Lin

Lecture—2 hours; laboratory—9 hours. Prerequisite: courses 172, 177, Computer Science Engineering 150. Real-time system design using multiple 16-bit microprocessors. System development and emulation through IBM/AT driven STD-bus system, and Intel's iRMX286 development system. Bus arbitration, design of basic real-time executive, and system design with iRMX289 real-time multitasking operating system.

**282. Operating System Models (3) III.** Ruschitzka

Lecture—3 hours. Prerequisite: course 182B; introductory probability theory course. Survey of formal models that are used in study of operating systems. Modeling of parallel processes and their synchronization in terms of partial orderings and Petri nets. Deterministic and probabilistic models for the evaluation of system performance measures.

**289A-U. Special Topics In Electrical Engineering and Computer Science (1-5) I, II, III.** The Staff (Chairperson in charge)

Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science, (B) Programming Systems, (C) Digital Systems, (D) Communications, (E) Signal Transmission, (F) Digital Communication, (G) Control Systems, (H) Robotics, (I) Signal Processing, (J) Image Processing, (K) High-Frequency Phenomena and Devices, (L) Solid-State Devices and Physical Electronics, (M)

Systems Theory, (N) Active and Passive Circuits, (O) Integrated Circuits, (P) Computer Software, (Q) Computer Engineering, (R) Microprocessing, (S) Electronics; (T) Electromagnetics; (U) Opto-Electronics. May be repeated for credit when the topic is different.

**290. Seminar (1) I, II, III.** The Staff (Chairperson in charge)

Seminar—1 hour. Discussion and presentation of current research and development. (S/U grading only.)

**290C. Graduate Research Group Conference in Electrical and Computer Engineering (1) I, II, III.** The Staff

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.)

**298. Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (S/U grading only.)

**299. Research (1-12) I, II, III.** The Staff (Chairperson in charge)

(S/U grading only.)

**Professional Course**

**390. The Teaching of Electrical Engineering (1) I, II, III.** The Staff

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.)

**Courses in Engineering: Computer Science**

**Lower Division Courses**

**10. Basic Concepts of Computing (3) I, II, III.** The Staff

Lecture—2 hours; discussion—1 hour. Prerequisite: two years of high school algebra. Introduction to principles of computing. Methods and algorithms for solving problems by use of a digital computer. Not intended for students in physical sciences, engineering, or mathematics. (Not open for credit to students who have completed course 30, 30H, Engineering 5, or former course 8, 20, or Mathematics 29A).

**30. Introduction to Programming and Problem Solving (4) I, II, III.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A (may be taken concurrently). Introduction to digital computation and computer programming; algorithms, their design and efficiency. Basic programming design, running, debugging, testing of well-structured programs. Programming language Pascal will be used to solve simple problems. (Not open for credit to those who have completed Engineering 5 or Computer Science Engineering 30H, and only 2 units of credit allowed those who have completed course 10, former course 20 or Mathematics 19. Those who have completed Engineering 5 or the equivalent and transfer into an Electrical Engineering or Computer Science and Engineering major should take the Engineering 5-Computer Science Engineering 32 sequence as opposed to the Computer Science Engineering 30-40 or 30H-40H sequence.)

**30H. Honors Structure and Interpretation of Computer Programs I (4) I.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: major in Computer Science and Engineering or Electrical Engineering; Mathematics 16A or 21A (may be taken concurrently). More intensive treatment of material in courses 30-40. Mathematics SAT score 680 or above suggested. Mathematical foundations of computer science. Procedural abstraction, data abstraction, and modularity. The Scheme programming language is used. Design and analysis of algorithms are stressed. (Not open for credit to those who have completed Engineering 5 or Computer Science

Engineering 30, and only 2 units of credit allowed those who have completed course 10 or former course 20. Students who have completed Engineering 5 or the equivalent and are transferring to a major in Electrical Engineering or Computer Science and Engineering should take Engineering 5-Computer Science Engineering 32 sequence as opposed to Computer Science Engineering 30-40 or 30H-40H sequence.)

**32. Pascal Programming and Software Development (4) I, II, III. The Staff**

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16A or 21A (may be taken concurrently); Engineering 5 or the equivalent, or consent of instructor. Intended for graduate and transfer students. Fast-paced course teaching Pascal programming language as well as software development techniques. Topics covered include Pascal syntax, dynamic data structures, and programming design and implementation techniques. (Not open to those who have received credit for Computer Science Engineering 30, 30H, 40, 40H. Those who take Engineering 5 or the equivalent and transfer into an Electrical Engineering or Computer Science and Engineering major should take the Engineering 5-Computer Science Engineering 32 sequence as opposed to the Computer Science Engineering 30-40 or 30H-40H sequence.)

**40. Introduction to Software Development (4) I, II, III. The Staff**

Lecture—3 hours; discussion 1—hour. Prerequisite: course 30. Elements of program design; programming style, documentation, efficiency, debugging, verification; advanced features of Pascal and introduction to FORTRAN; introduction to dynamic data structures. (Not open to those who have received credit for Engineering Computer Science 32 or 40H. Those who take Engineering 5 or the equivalent and then transfer into an Electrical Engineering or Computer Science and Engineering major should take the Engineering 5- Computer Science Engineering 32 sequence as opposed to the Computer Science Engineering 30-40 or 30H-40H sequence.)

**\*40H. Honors Structure and Interpretation of Computer Programs II (4) II. The Staff**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 30H. More intensive treatment of material in course 40. Continuation of 30H. Comparison of Pascal-like languages and LISP-like languages. Defining recursive data structures such as linked lists and trees. Advanced abstraction and problem solving techniques. Programming languages Scheme and Pascal are used. (Not open for credit to those who have completed Engineering 5 or Computer Science Engineering 40. Students who have completed Engineering 5 or the equivalent and are transferring to a major in Electrical Engineering or Computer Science and Engineering should take Engineering 5-Computer Science Engineering 32 sequence as opposed to Computer Science Engineering 30-40 or 30H-40H sequence.)

**89A-L. Special Topics in Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)**

Lecture, laboratory or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science Theory; (B) Architecture; (C) Programming Languages and Compilers; (D) Operating Systems; (E) Software Engineering; (F) Data Bases; (G) Artificial Intelligence; (H) Computer Graphics; (I) Networks; (J) Computer-Aided Design; (K) Scientific Computing; (L) Computer Science. May be repeated for credit when the topic is different.

**92. Internship in Computer Science (1-5) I, II, III**

The Staff

Work-learn experience. Prerequisite lower division standing; project approval prior to period of internship. Supervised work-learn experience in computer science. May be repeated for credit. (P/NP grading only.)

**98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

**99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge)**

(P/NP grading only.)

**Upper Division Courses**

**100. Discrete Structures (3) I, II, III. Archer, Kou**

Lecture—3 hours. Prerequisite: Mathematics 21C.

Discrete structures and applications to various areas

of computer science; mathematical models and

mathematical reasoning, sets, relations, functions,

methods of counting. (No credit allowed to those

who have had former Electrical and Computer Sci-

ence Engineering 191.)

**110. Data Structures and Programming (4) I, II, III. Martel**

Lecture—3 hours; discussion—1 hour. Prerequisite:

course 40 or 40H or consent of instructor; Electrical

and Computer Science Engineering 70 or former

Electrical and Computer Science Engineering 170.

Concept of data-type, arrays, records, set structures

and their representation. Sequential file structures.

Dynamic information structures, linear lists, tree

structures. Hash techniques, recursive algorithms,

sorting and searching. (Not open for credit to stu-

dents who have completed former Electrical and

Computer Science Engineering 180 or former Mathe-

matics 129A.)

**120. Automata Theory and Formal Languages (3) I, II. Archer, Kou, Linz**

Lecture—3 hours. Prerequisite: course 100. Finite

automata and regular expressions, deterministic

and nondeterministic automata, finite-state trans-

ducers. Regular sets, pumping lemma, closure

properties, minimization. Context-free grammars,

derivations, normal forms, ambiguity. Pushdown

automata, pumping lemma and their relation to con-

text-free languages. (Not open for credit to students

who have completed former course 126 or former

Mathematics 171.)

**122. Algorithm Design and Analysis (3) II, III. Gus-field, Martel**

Lecture—3 hours. Prerequisite: courses 100, 110.

Complexity of algorithms, bounds on complexity,

algorithms for searching, sorting, pattern matching,

graph manipulation, combinatorial problems, intro-

duction to NP-complete problems. (Not open for

credit to students who have completed former

course 123 or former Mathematics 129B.)

**140. Programming Languages (4) I, II. Archer, Fisher**

Lecture—3 hours; discussion—1 hour. Prerequisite:

course 110. Syntactic definition of programming lan-

guages. Introduction to programming language fea-

tures including variables, data types, data abstrac-

tion, scoping, parameter disciplines, exception han-

dling. Comparative study of several high-level lan-

guages. (Not open for credit to students who have

completed former course 124 or former Mathematics

129C.)

**142. Compilers (4) III. Archer**

Lecture—3 hours; discussion—1 hour. Prerequisite:

courses 120 and 140; course 160 recommended.

Principles and techniques of lexical analysis, pars-

ing, semantic analysis, and code generation. Imple-

mentation of compilers. (Not open for credit to stu-

dents who have completed former Electrical and

Computer Science Engineering 181.)

**150. Operating Systems and System Programming (4) I, II. Levitt, Olsson**

Lecture—3 hours; discussion—1 hour. Prerequisite:

Electrical and Computer Science Engineering 70;

Electrical and Computer Science Engineering 171

strongly recommended. 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.

**152. Introduction to Computer Networks (3) I. Mukherjee**

Lecture—3 hours. Prerequisite: Electrical and Com-

puter Science Engineering 171. Overview of uses of

local and wide-area computer networks. ISO seven-layer model. Physical aspects of data transmission. Data link level protocols. Local area networks. Wide area networks.

**160. Introduction to Software Engineering (4) II, III. Fisher, Levitt**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 110 and 140. Requirements, specification, design, implementation, testing, and verification of large software systems. Study and use of software engineering methodologies. Team programming. (Not open for credit to students who have completed former course 129 or former Mathematics 176.)

**165. Database Systems (4) II. Walters**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Database hardware; input techniques; file types; database models; reliability, integrity and security; operating system interfaces with databases.

**\*168. Information Systems (3) I. Walters**

Lecture—3 hours. Prerequisite: course 40 or the equivalent; upper division standing. Design, creation, implementation, and case study evaluation of information systems. Project-oriented, self-paced implementation of actual information including survey collection of data, input design, and development of components to edit, sort, and retrieve data. Case study of typical information systems problems. Offered in even-numbered years.

**170. Introduction to Artificial Intelligence (4) II. Levitt**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110; course 140 or experience with LISP recommended. Design and implementation of intelligent computer systems. LISP as a programming language for building symbolic processing systems. Knowledge representation and organization. Memory and inference. Problem solving. Natural language processing. (Not open for credit to students who have completed former course 128 or former Mathematics 174.)

**172. Natural Language Processing (4) I. Alvarado**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110. Introduction to cognitive modeling. Study of knowledge structures and processes required for computer comprehension of human languages. Conceptual analysis based on Conceptual Dependency Theory, scripts, goals, and plans. Techniques for designing and implementing natural language parsers and generators.

**175. Computer Graphics (4) I, II. Joy**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110, Mathematics 22A. Principles of computer graphics. Current graphics hardware, elementary operations in two- and three-dimensional space, transformational geometry, clipping, graphics system design, standard graphics systems. Individual projects. (Not open for credit to students who have completed former course 127 or former Mathematics 173.)

**189A-L. Special Topics in Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)**

Lecture, laboratory or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science Theory; (B) Architecture; (C) Programming Languages and Compilers; (D) Operating Systems; (E) Software Engineering; (F) Data Bases; (G) Artificial Intelligence; (H) Computer Graphics; (I) Networks; (J) Computer-Aided Design; (K) Scientific Computing; (L) Computer Science. May be repeated for credit when the topic is different.

**190C. Research Group Conferences in Computer Science (1) I, II, III. The Staff**

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.)

**192. Internship in Computer Science (1-5) I, II, III. The Staff (Chairperson in charge)**

Work-learn experience. Prerequisite: completion of a minimum of 84 units; project approval prior to period of internship. Supervised work-study experience in computer science. May be repeated for credit. (P/NP grading only.)

- 198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)
- 199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

### Graduate Course

#### 220. Theory of Computation

(3) II. Linz  
Lecture—3 hours. Prerequisite: courses 120 and 122. Theory of computation: the notion of effective procedures, computability, Turing machines, Post symbol manipulation system, models similar to digital computers, computational complexity and intractable problems. (Not open for credit to students who have completed the same topic under Electrical and Computer Science Engineering 289.)

**\*221. Formal Language Theory** (3) III. Archer, Linz  
Lecture—3 hours. Prerequisite: course 220. Definition and properties of formal languages, deterministic context-free languages, context-sensitive languages, abstract families of languages, special topics of current interest.

#### 222A. Design and Analysis of Algorithms

(3) I. Gusfield, Martel  
Lecture—3 hours. Prerequisite: course 122; Statistics 131A recommended. Techniques for designing efficient algorithms and analyzing their complexity. Use of data structures. Counting and estimating. Search techniques. Graph algorithms. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 277A.)

#### 222B. Advanced Design and Analysis of Algorithms

(3) II. Gusfield, Martel  
Lecture—3 hours. Prerequisite: course 222A Advanced topics in complexity theory. Problem classification. The classes P, NP, P-space, co-NP. Matching and network flow algorithms. Matrix multiplication. Approximation algorithms. Selected advanced topics. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 277B.)

#### 223. Parallel Algorithms

(3) II. Martel  
Lecture—3 hours. Prerequisite: course 222A. Models of parallel computer systems including PRAMs, loosely coupled systems and interconnection networks. Parallel algorithms for classical problems are studied as well as general techniques for their design and analysis. Lower bounds on parallel computation are proved in several settings.

#### 225. Graph Theory

(3) II. Hakimi  
Lecture—3 hours. Prerequisite: graduate standing in electrical engineering or computer science engineering or consent of instructor. Fundamental concepts, Vector space 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.

**\*226. Computational Algorithms in VLSI** (3) I. Kou  
Lecture—3 hours. Prerequisite: course 122; Electrical and Computer Science Engineering 176. Application and inherent limitations of using VLSI to implement computational algorithms; design and analysis of algorithms for the design of VLSI circuits; VLSI test set generation and simulation.

**240. Programming Languages** (3) II. Archer, Fisher  
Lecture—3 hours. Prerequisite: courses 140, 142. Advanced topics in programming languages including formal syntax and semantics, formal verification, modularization, data flow languages, object-oriented languages, concurrent processing. Principles of programming language design.

**242. Translation of Programming Languages** (3) III. Archer, Fisher  
Lecture—3 hours. Prerequisite: course 240. Lexical analysis, parsing, storage management, symbol table design, semantic analysis and code generation. LR, LALR grammars. Compiler-compilers. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 278B.)

#### \*243. Code Generation and Optimization

(3) I. Fisher  
Lecture—3 hours. Prerequisite: course 242. Advanced code generation techniques. Representation of intermediate code. Data flow analysis, code movement, loop optimization, common subexpression elimination, and peephole optimization. Optimization by program transformation. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 278C.)

#### 244. Principles of Concurrent Programming

(3) I. Olsson  
Lecture—3 hours. Prerequisite: course 100, 150 or Electrical and Computer Science Engineering 182B. Fundamental concepts and applications of concurrent programs; concurrent program verification and derivation; synchronization mechanisms in programming languages; distributed programming techniques; case studies of languages.

#### 247. Parallel Languages

(3) I. Keller  
Lecture—3 hours. Prerequisite: course 240. Language constructs for parallel computation in functional-programming, logic-programming, and related languages. Representation and implementation of task spawning and synchronization. Forms of parallelism, including explicit vs. implicit, AND vs. OR, and All-Solutions vs. Committed-Choice. Techniques of data flow, suspensions, graph reduction, backtracking, difference lists, etc. Mapping to architectures.

#### 250A. Advanced Computer Architecture

(3) I. Matloff  
Lecture—3 hours. Prerequisite: course 150; Electrical and Computer Science Engineering 171. Processor complexity; the relationship between processor and memory speeds; opportunities for parallelism

#### 250B. High-Performance Uniprocessing

(3) II. Farrrens  
Lecture—3 hours. Prerequisite: course 250A. Maximizing uniprocessor performance. Barriers to high performance; solutions to the problems; historical and current processor designs.

#### 250C. Parallel Processing

(3) III. Park  
Lecture—3 hours. Prerequisite: course 250A. Using parallelism to increase computational speed. Interconnection topologies; parallel programming paradigms; architecture-specific algorithms; synchronization; parallel operating systems.

#### 252. Local Area Networks

(3) II. Mukherjee  
Lecture—3 hours. Prerequisite: course 152. Local area networks and their functions, structures, and access protocols. Emphasis on performance modeling and analysis of multiaccess techniques in polling, ring, and random access networks. Also discussed are standards, example products, and recent directions in research.

#### 253. Cryptography and Data Security

(3) I. Levitt  
Lecture—3 hours. Prerequisite: course 150; consent of instructor. Methods of protecting data in computer and communication systems from unauthorized disclosure and modification. Introduction to mathematical principles of security with applications to operating systems, database systems, and computer networks.

#### 256A. Analytic Methods for Computer Systems

Design (3) I. Matloff  
Lecture—3 hours. Prerequisite: course 100, Electrical and Computer Science Engineering 171, Statistics 131A or the equivalent; Electrical and Computer Science Engineering 182A and 182B recommended. Use of simulation and queuing theory in computer design. Applications to memory hierarchies; file storage; computer networks; fault-tolerance; scheduling. Only one unit of credit allowed to students who have completed former Electrical and Computer Science Engineering 186.

#### \*256B. Modeling and Analysis of Computer Networks

(3) III. Matloff  
Lecture—3 hours. Prerequisite: course 256A. Use of simulation and queuing theory in the design of wide-area and local computer networks, with particular emphasis on optimization. Multiple access protocols, capacity planning, topological design, flow/congestion control, routing.

#### 260. Software Engineering

(3) I. Fisher  
Lecture—3 hours. Prerequisite: courses 140, 142, 160. Advanced techniques for program specification, design, implementation, testing, and documentation. Application of techniques to large-scale software systems. (Not open for credit to students who have completed the same topic under Electrical and Computer Science Engineering 289.)

#### \*261. Program Verification

(3) I. Archer  
Lecture—3 hours. Prerequisite: Mathematics 125 or Philosophy 112 or familiarity with first-order logic. Knowledge of an iterative and a 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.

#### \*262. Formal Specification

(3) II. Archer  
Lecture—3 hours. Prerequisite: course 261. 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 even-numbered years.

#### 265. Database Systems

(3) III. Walters  
Lecture—3 hours. Prerequisite: course 165. Data models (especially relational and entity relation), performance measures, query languages and optimizers, data base security and integrity, and distributed systems. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 280.)

#### 269. MUMPS Language

(3) I. Walters  
Lecture—3 hours. Prerequisite: course 140. Review of MUMPS language: history, features, implementation techniques, validation procedures, performance evaluation and applications. Projects in programming, meta language implementation, validation and performance measures.

#### 270. Artificial Intelligence

(3) II. Alvarado  
Lecture—3 hours. Prerequisite: course 140; course 170 recommended. 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. (Not open for credit to students who have completed former Electrical and Computer Science Engineering 279.)

#### 272. Cognitive Modeling

(3) III. Alvarado  
Lecture—3 hours. Prerequisite: courses 170 and 270. Current issues in artificial intelligence emphasizing the modeling and simulation of human performance. Discussion and implementation of current methods in knowledge representation, memory processes and organization, natural language understanding, and planning and problem solving.

#### \*274. Automated Deduction

(3) III. Archer  
Lecture—3 hours. 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. Offered in even-numbered years.

#### 275. Computer Graphics

(3) II. Joy  
Lecture—3 hours. Prerequisite: course 175. Advanced topics in computer graphics. Hidden surface models, rendering of various surface types, subdivision methods, shading techniques, anti-aliasing, modeling techniques.

#### \*276. Advanced Raster Graphics

(3) III. Joy  
Lecture—3 hours. Prerequisite: course 275. Advanced topics in raster graphic techniques. Ray tracing models, advanced modeling techniques, anti-aliasing, animation. Discussion of current research in the field.

**278. Computer-Aided Geometric Design (3) III.** Joy Lecture—3 hours. Prerequisite: course 175; Applied Science Engineering 115 or Mathematics 128A. Mathematical techniques for the definition and manipulation of curves and surfaces. Coon's patches, Bezier curves and surfaces. B-spline curves and surfaces, beta-splines, box-splines. Integration into various computer graphics rendering models, and computer-aided design systems.

**289A-L. Special Topics in Computer Science (1-5) I, II, III.** The Staff

Lecture, laboratory, or combination. Prerequisite: consent of instructor. Special topics in (A) Computer Science Theory; (B) Architecture; (C) Programming Languages and Compilers; (D) Operating Systems; (E) Software Engineering; (F) Data Bases; (G) Artificial Intelligence; (H) Computer Graphics; (I) Networks; (J) Computer-Aided Design; (K) Scientific Computing; (L) Computer Science. May be repeated for credit when the topic is different.

**290. Seminar in Computer Science (1) I, II, III.** The Staff

Seminar—1 hour. Participating seminar; discussion and presentation of current research and development in computer science. (S/U grading only.)

**290C. Graduate Research Group Conference (1) I, II, III.** The Staff (Chairperson in charge)

Discussion—1 hour. Research problems, progress and techniques in computer science. May be repeated for credit. (S/U grading only.)

**298. Group Study (1-5) I, II, III.** The Staff

Lecture, laboratory, or combination. Prerequisite: consent of instructor. (S/U grading only.)

**299. Research (1-12) I, II, III.** The Staff

(S/U grading only.)

**Professional Course**

**390. The Teaching of Computer Science (1) I, II, III.** The Staff

Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in 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.)

Jerald M. Henderson, D.Engr., Professor  
(Mechanical Engineering, Food Science and Technology)

Ronald A. Hess, Ph.D., Professor (Aeronautical Science and Engineering)

Myron A. Hoffman, Sc.D., Professor  
David G. Howitt, Ph.D., Associate Professor  
(Materials Science and Engineering)

Mont Hubbard, Ph.D., Professor (Aeronautical Science and Engineering)

Maury L. Hull, Ph.D., Professor

Dean C. Karnopp, Ph.D., Professor

John D. Kemper, Ph.D., Professor

Ian Kennedy, Ph.D., Associate Professor

Wolfgang Kollmann, Dr.ing, Professor (Aeronautical Science and Engineering)

Harvard Lomax, M.A., Adjunct Professor

John Mantzaras, Ph.D., Assistant Professor

Donald L. Margolis, Ph.D., Professor

Allan A. McKillop, Ph.D., Professor

Amiya K. Mukherjee, Ph.D., Professor (Materials Science and Engineering)

Zuhair A. Munir, Ph.D., Professor (Materials Science and Engineering)

Howard L. Needles, Ph.D., Professor (Textiles and Clothing)

Bahram Ravani, Ph.D., Associate Professor

Lawrence Rehfeld, Ph.D. Professor (Aeronautical Science and Engineering)

Subhash Risbud, Ph.D., Professor (Materials Science and Engineering)

Nesrin Sarigul-Klijn, Ph.D., Associate Professor (Aeronautical Science and Engineering)

James F. Shackelford, Ph.D., Professor (Materials Science and Engineering)

Joseph L. Steger, Ph.D., Professor (Aeronautical Science and Engineering)

John B. Stek, Ph.D., Lecturer

Cornelis P. van Dam, Ph.D., Associate Professor (Aeronautical Science and Engineering)

Steven Velinsky, Ph.D., Associate Professor

Robert F. Warming, Ph.D., Adjunct Professor

Bruce R. White, Ph.D., Professor (Aeronautical Science and Engineering)

An Tzu Yang, D.E.Sc., Professor

S. Haig Zeronian, Ph.D., D.Sc., Professor (Textiles and Clothing)

Steve Wortman, Lecturer

S. Haig Zeronian, Ph.D., D.Sc., Professor (Textiles and Clothing)

**Courses in Engineering: Mechanical**

(Courses in Mechanical Engineering are listed below; courses in Aeronautical Science and Engineering and Materials Science and Engineering are listed immediately following.)

**Lower Division Courses**

**1. Mechanical Engineering (1) II.** The Staff (Brandt in charge)

Lecture—1 hour. Description of the field of mechanical engineering with examples taken from industrial applications; discussion of the practice with respect to engineering principles, ethics and responsibilities. (P/NP grading only.)

**92. Internship in Mechanical Engineering (1-5) I, II, III.** The Staff (Brandt in charge)

Work-learn experience. 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.)

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Brandt in charge)

Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

**Upper Division Courses**

**134. Vehicle Stability (4) III.** Hubbard

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 171 and Engineering 102B. Introduction to static and dynamic stability characteristics of ground transportation vehicles. Examples drawn from automobiles, trains, articulated vehicles, motorcycles, bicycles and others. Lateral handling characteristics, oversteer, understeer. Laboratory experiments illustrate effects of vehicle parameters on dynamic vehicle response.

**150A. Mechanical Design (3) I, III.** Beadle

Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 104B, course 150L (may be taken concurrently). Restricted to Aeronautical and Mechanical Engineering and Materials Science majors. The principles of engineering mechanics applied to fundamentals of mechanical design. Theories of static and fatigue failure of metals. Design projects emphasizing the progression from conceptualization to hardware.

**150B. Mechanical Design (4) I, II.** Frank, Velinsky

Lecture—3 hours; discussion—1 hour. Prerequisite: course 150A. Restricted to Aeronautical and Mechanical Engineering and Materials Science majors. Principles of engineering mechanics, failure theories and fatigue theory applied to design and selection of mechanical components. Design projects which concentrate on design, engineering analysis, methods of manufacture, material selection and cost. Introduction to computer-aided design.

**150L. Manufacturing Processes (2) I, II, III.** Henderson

Discussion—1 hour; laboratory—3 hours. Restricted to junior and senior Mechanical, Aeronautical, and Materials Science Engineering majors. Introduction to and experience with modern manufacturing methods and computer-aided manufacturing and their role in engineering design and development process.

**151. Statistical Methods in Design (3) II.** Beadle

Lecture—3 hours. Prerequisite: course 150A. Methods of statistical analysis with emphasis on applications in mechanical design. Applications include product evaluation and decision making, stress-strength interference, probabilistic design, systems reliability, and fatigue under random loading.

**152. Mechanism Design (3) I.** Yang

Lecture—3 hours. Prerequisite: Engineering 102A. Application of complex-number method to kinematic, static, and dynamic analyses of plane mechanism and dynamic balancing of mechanisms. Design of epicyclic gear trains and intermittent mechanisms. Introduction to kinematic synthesis of mechanisms

## Engineering: Mechanical

(College of Engineering)

Harry Brandt, Ph.D., Chairperson of the Department  
Department Office, 2020 Bainer Hall (916-752-0580)

**Faculty**

James W. Baughn, Ph.D., Professor (Aeronautical Science and Engineering)

Charles W. Beadle, Ph.D., Professor

Enzo Bertolini, Ph.D., Adjunct Professor

Harry Brandt, Ph.D., Professor

John W. Brewer, Ph.D., Professor

Steve Carniglia, Ph.D., Lecturer (Materials Science and Engineering)

Jean-Jacques Chattot, Ph.D., Professor

Harry A. Dwyer, Ph.D., Professor (Aeronautical Science and Engineering)

Andrew A. Frank, Ph.D., Professor

Clyne F. Garland, M.S., Professor Emeritus

Warren H. Giedt, Ph.D., Professor Emeritus

Jeffery C. Gibeling, Ph.D., Associate Professor (Materials Science and Engineering)

John F. Gisla, J.D., Lecturer

Joanna Groza, Ph.D., Associate Professor (Materials Science and Engineering)

Mohamed Hafez, Ph.D., Professor (Aeronautical Science and Engineering)

Steve Carniglia, Ph.D., Adjunct Professor

Jeffery C. Gibeling, Ph.D., Associate Professor

Joanna Groza, Ph.D., Associate Professor

David G. Howitt, Ph.D., Associate Professor

Amiya K. Mukherjee, D.Phil., Professor

Zuhair A. Munir, Ph.D., Professor

Howard L. Needles, Ph.D., Professor (Textiles and Clothing)

Subhash Risbud, Ph.D., Professor

James F. Shackelford, Ph.D., Professor

for function generation, curve tracing, and body guidance.

**162. Modern Power Systems (4) II.** Hoffman

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B. Study of modern powerplants for electric power generation and cogeneration. Thermodynamic analysis of different powerplant concepts using fossil fuels, nuclear fuels, solar energy, etc. Design studies of some specific powerplants.

**165. Fundamentals of Heat Transfer (4) I, II.** McKillop, Dwyer

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 5, 103B and 105B; restricted to Aeronautical and Mechanical Engineering and Materials Science majors. Fundamentals of conduction, convection and radiation heat transfer; applications to engineering equipment with use of digital computers.

**171. Analysis, Simulation, and Design of Dynamic Systems (4) I.** Karnopp, Margolis

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A, Engineering 102B and 180; restricted to Aeronautical and Mechanical Engineering and Materials Science majors. Modeling of dynamic engineering systems in various energy domains. Analysis of response of linear system models. Digital computer simulation.

**172. Automatic Control of Engineering Systems (4) II.** Brewer

Lecture—3 hours; discussion—1 hour. Prerequisite: course 171. Classical feedback control for engineering systems. Control system design using time and frequency domain methods. State space techniques.

**176. Measurement Systems (3) II, III.** Valisky

Lecture—2 hours; discussion—1 hour; laboratory—1 hour. Prerequisite: Engineering 100 and 102A; restricted to Aeronautical and Mechanical Engineering and Materials Science students. Theory of measurements; measurement techniques for mechanical systems; transducers; data manipulation and processing; data digitization.

**184A. Mechanical Engineering Design Project (2) I, II, III.** The Staff

Laboratory—6 hours. Prerequisite: senior standing in Mechanical Engineering; consent of instructor. Performance of a major design project which includes design and possible development and evaluation of mechanical engineering system.

**184B Mechanical Engineering Design Project (2) I, II, III.** The Staff

Laboratory—6 hours. Prerequisite: course 184A; consent of instructor. Performance of projects which include design and possible development and evaluation of a mechanical engineering system.

**185. Mechanical Systems Design Projects (4) III.** Henderson

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series, 184-188). Design of mechanical systems. Engineering case studies will help to illustrate the engineering design process and its use in design of engineering systems. Grading based on individual contributions to projects.

**186. Thermal Systems Design Project (4) III.** Mantzaras

Lecture—3 hours; discussion—1 hour. Prerequisite: course 165; senior standing in Mechanical Engineering or Physics (enrollment preference to students who have not taken any of course series, 184-188). Design of a thermal system such as a power plant or engine, including consideration of engineering and economic factors. Grading based on individual contributions to project. Limited enrollment.

**187. Control Systems Design Project (4) III.** Frank

Lecture—3 hours; discussion—1 hour. Prerequisite: course 172; senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series, 184-188). Design of dynamic engineering systems. Formulation of goals, mathematical modeling of plant, con-

sideration of passive, open loop, and closed loop active solutions. Hardware and cost/performance considerations. Grading based on individual contributions to projects.

**188. Vehicle Systems Design Project (4) II.** Frank

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 150B; senior standing in Mechanical Engineering (enrollment preference to students who have not taken any of course series, 184-188). Design of vehicle systems, including components, and/or complete vehicles for groups or individuals. Students will design, analyze, construct and evaluate a vehicle-related component. Grading based on individual contributions to projects. Limited enrollment.

**192. Internship in Engineering (1-5) I, II, III.** The Staff (Brandt in charge)

Work-learn experience. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work-study experience in mechanical engineering. May be repeated for credit. (P/NP grading only.)

**198. Directed Group Study (1-5) I, II, III.** The Staff (Brandt in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Brandt in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**205. Thermal Radiation (3) II.** Brandt

Lecture—3 hours. Prerequisite: course 165 or consent of instructor. The transfer of radiant energy. Geometrical and spectral characteristics of systems involving thermal radiation. Gaseous radiation. Applications to solar energy systems.

**208A. Experimental Methods in the Thermal Sciences (3) I.** Baughn

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 165. Experiment design, statistics uncertainty analysis. Steady-state and transient temperature measurement. Steady-state flow and pressure measurements.

**208B. Experimental Methods in Fluid Mechanics and Combustion (3) III.** Kennedy

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 165 and Engineering 103B. 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 in even-numbered years.

**208C. Experimental Methods in Fluid Mechanics and Hot-Wire Anemometry (3) III.** White

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: Engineering 103B. Measurements in fluid mechanics using experimental techniques to determine flow direction, wall shear stress, turbulence quantities, etc. Introduction to hot-wire anemometry and its application to the measurement of turbulent flows. Introduction to data acquisition of fluid mechanics measurements. Offered in odd-numbered years.

**210A. Advanced Fluid Mechanics and Heat Transfer (4) I.** McKillop

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B, course 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.

**210B. Advanced Fluid Mechanics and Heat Transfer (4) II.** Dwyer

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.

**\*210C. Advanced Numerical Fluid Mechanics (4) III.** Dwyer

Lecture—3 hours; discussion—1 hour. Prerequisite: course 210B. Development and solution of basic

finite difference and finite volume equations which describe fluid flow and heat transfer for mechanical and aeronautical applications. Applications to combustion, pipe flows, high Peclet number heat transfer, and the full Navier-Stokes equations. Complex grid generation.

**211. Fluid Flow and Heat Transfer Design (4) I.** Hoffman

Lecture—3 hours; discussion—1 hour. Prerequisite: course 210A (may be taken concurrently) or consent of instructor. Design aspects of selected topics such as heat conduction, thermal stresses, fins; heat transport in ducts, boundary layers and separated flows; impingement and film cooling; heat exchangers; flow in diffusers, flow over airfoils and blades. Offered in odd-numbered years.

**212. Advanced Heat Transfer with Phase Change (4) III.** Hoffman

Lecture—3 hours; discussion—1 hour. Prerequisite: course 165. Study of complex phenomena occurring in two-phase flow, boiling and condensation. Development of fundamental relations. Use of these relations with experimental data to develop semi-empirical working relations; application to various energy system and power-plant problems. Offered in odd-numbered years.

**213. Advanced Turbulence Modeling (4) III.** Kollmann

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 in even-numbered years.

**216. Advanced Thermodynamics (4) I.** Mantzaras

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 105B. 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.

**217. Combustion (4) II.** Kennedy

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B and 105B. Review of chemical thermodynamics and chemical kinetics. Discussions of reacting flows, their governing equations and transport phenomena; detonations; laminar flame structure and turbulent combustion.

**218. Advanced Energy Systems (4) I.** Hoffman

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B, 105B, 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. Offered in even-numbered years.

**220A-220B. Mechanical Vibrations (3-3) II-III.** Karnopp

Lecture—3 hours. Prerequisite: Engineering 122. Applications of vibration theory to systems with many degrees of freedom and continuous systems. Introduction to random vibrations.

**222. Advanced Dynamics (3) I.** Karnopp

Lecture—3 hours. Prerequisite: Engineering 102B. Dynamics of particles and of rigid bodies with advanced engineering applications; generalized coordinates; Hamilton's Principles; Lagrange's Equations; Hamilton-Jacobi theory.

**224. Kinematic Design of Mechanisms (3) II.** Yang

Lecture—3 hours. Prerequisite: course 152 or consent of instructor. Introduction to Burmester theory of the rational design of link mechanisms. Geometric concept of two- and three-dimensional rigid-body displacements, instantaneous invariants, higher order path curvature analysis, circle- and center-point curves. Graphic and computer methods for kinematic design. Offered in even-numbered years.

**225. Spatial Kinematics and Robotics** (3) II. Yang  
 Lecture—3 hours. Prerequisite: course 222 or consent of instructor. Spatial kinematics: point and line coordinates and their transformations; concept of screw systems and instantaneous invariants for rigid body motion. Robotics: solving for kinematic equations; differential relationships; motion trajectories. Application of dual-number matrices, screw calculus, and associated analytical methods. Offered in odd-numbered years.

**226. Acoustics and Noise Control** (3) I. Hubbard  
 Lecture—3 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 of mufflers, acoustic enclosures, room acoustics, design of quiet machinery. Offered in even-numbered years.

**250. Project Engineering** (3) III. Henderson  
 Lecture—2 hours; discussion—1 hour. Planning, organization, and management of engineering projects. Studies of selected problems which illustrate the design process and management methods in advanced mechanical engineering systems. Experience with leading a project.

**255. Computer-Aided Design and Manufacturing** (3) III. Ravani  
 Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 180 and course 150B. Proficiency in a high-level programming language such as FORTRAN, Pascal, or C. Studies of computational and computer graphic techniques in design and manufacturing. Use of numeric and non-numeric computations and geometric tools in design and manufacturing.

**270. Modeling and Simulation of Engineering Systems** (3) I. Karnopp  
 Lecture—3 hours. Prerequisite: course 172 or consent of instructor. Multi-ports models of mechanical, electrical, hydraulic and thermal devices; bond graphs, block diagrams and state space equations; Hamilton's principle for complex systems; formulation for analog and digital simulation; identification; instrumentation, approximate models of distributed systems.

**271. Design of Multivariable Control Systems** (3) II. Margolis  
 Lecture—3 hours. Prerequisite: course 270 or consent of instructor. Modern methods of state variable feedback applied to control system design. Introduction to observers and equivalent dynamic feedback. Stress on practical application of theory to engineering systems in various energy domains.

**272A. Mathematical Foundations of System and Control Theory** (4) I. Brewer  
 Lecture—4 hours. Prerequisite: course 172. Singularity functions, Laplace transforms, and Z-transforms. Algebra of groups and rings and of polynomials and matrices. Reducibility, controllability, and observability. Observers and feedback control for single input, single output systems. Equal emphasis on frequency domain and state variable methods.

**272B. Multivariable Feedback Control and Estimation Theory** (4) II. Brewer  
 Lecture—4 hours. Prerequisite: course 272A. Emphasis on multi-input, multi-output systems. Digital and continuous time control and estimation. Introduction to singular value methods and quantitative feedback theory. Optimum Wiener-Hopf design and other frequency domain methods.

**272C. Mathematical Foundations of Nonlinear Control Theory** (4) III. Brewer  
 Lecture—4 hours. Prerequisite: course 272B. Emphasis on the mathematical analysis of feedback systems which contain a non-linear element. Poincare-Bendixson theory and limit cycles. Harmonic balance and describing functions. Chaos and strange attractors. Lie algebras and linearization.

**274. Analysis and Design of Digital Control Systems** (3) III. Hess  
 Lecture—3 hours. Prerequisite: course 172 or consent of instructor. Discrete systems analysis; digital filtering; sample data systems; state space and

transform design techniques; quantization effect; specific applications to aircraft.

**276A. Digital Data Acquisition and Analysis** (3) I. Gibeling  
 Lecture—2 hours; discussion—1 hour. Prerequisite: course 176. Application of microcomputers and mini-computers to data acquisition and control. Topics include computer organization, hardware for laboratory applications of computers, fundamentals of interfaces between computers and experimental equipment, programming techniques for data acquisition and control, and basic data analysis.

**276B. Digital Data Acquisition and Analysis** (3) II. Frank  
 Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 5, 118, and 180; course 176. Theory and application of modern techniques in digital data analysis. Topics include statistical description of data, convolution and correlation, and frequency analysis using the discrete Fourier transform. Emphasis on applying these techniques in the experimental characterization of linear dynamic systems.

**277. Computer-Aided Design of Nonlinear Dynamic Systems** (3) III. Margolis  
 Lecture—2 hours; discussion—1 hour. Prerequisite: courses 270, 271. Application of bond graph modeling and control system design principles. The bond graph processor programs ENPORT and CAMP are used with advanced continuous system modeling programs to simulate the dynamic response of engineering systems.

**280. Advanced Engineering Analysis** (3) I. Brandt  
 Lecture—3 hours. Prerequisite: Engineering 180 or the equivalent. Applications in mechanical engineering of advanced analytical and numerical techniques. Topics include probability theory, calculus of variations, classification of differential equations, and advanced numerical methods.

**289A-289B. Special Topics in Mechanical Engineering** (1-5) I, II, III. Hull  
 Lecture—1-5 hours. Prerequisite: consent of instructor. Special topics in (289A) musculo-skeletal system biomechanics; (289B) orthopaedic biomechanics.

**290C. Graduate Research Conference** (1) I, II, III. The Staff (Brandt in charge)  
 Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress, and techniques in mechanical engineering research. May be repeated for credit. (S/U grading only.)

**295. Design Seminar** (1) I, II, III. The Staff  
 Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current mechanical engineering design literature and projects with presentations by students and faculty. (S/U grading only.)

**296. Fluid and Thermal Sciences Seminar** (1) I, II, III. The Staff  
 Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of the current literature and trends in fluid mechanics and thermal sciences. (S/U grading only.)

**297. Dynamic Systems and Control Theory Seminar** (1) I, II, III. The Staff  
 Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in system theory and automatic control with presentations by individual students. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Brandt in charge)

**299. Research** (1-12) I, II, III. The Staff (Brandt in charge)  
 Prerequisite: consent of instructor. (S/U grading only.)

#### Professional Course

**390. The Teaching of Mechanical Engineering** (1) I, II, III. The Staff (Brandt in charge)

Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in mechanical 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.)

### Courses in Aeronautical Science and Engineering

#### Lower Division Course

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
 Prerequisite: consent of instructor and lower division standing. (P/NP grading only.)

#### Upper Division Courses

**125. Aeronautical Engineering Fundamentals** (3) II. White  
 Lecture—3 hours. Prerequisite: Engineering 103A (may be taken concurrently). Aircraft subsystems and nomenclature. History and structure of the aviation industry. Design/development cycle. Fundamentals of aircraft aerodynamics, performance, stability and control, propulsion, structures, wind tunnel testing, flight simulators and flight testing.

**126. Theoretical Aerodynamics** (4) III. Hafez

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B. Study of flow field kinematics and dynamics. Flow about a body. Thin airfoil theory. Finite wing theory. Application of numerical methods to wing design.

**127. Applied Aircraft Aerodynamics** (4) I. van Dam  
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 126. Experimental characteristics of wing sections. High-lift devices. Lift and drag at high Mach numbers. Drag aerodynamics. Total aircraft drag estimation. Aerodynamic design procedures.

**128. Aircraft Performance** (4) II. van Dam

Lecture—3 hours; discussion—1 hour. Prerequisite: course 127. Aircraft propulsion systems and their performance characteristics. Methods for computing and presenting aircraft performance data. Modern techniques of numerical analysis and energy methods. Application of techniques to aircraft design.

**129. Aircraft Stability and Control** (4) II. Hess

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 102B. Aircraft static stability and control. Derivation and linearization of general equations of motion for aircraft. Longitudinal dynamic stability analysis. Introduction to lateral- directional dynamic stability. Stability derivatives. Application of numerical methods to aircraft design.

**130. Aircraft Preliminary Design** (4) III. van Dam

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 128 and 129. Aircraft preliminary design including estimation of weight/volume, aerodynamics, performance, stability and control. Design iteration and trade-off studies.

**131. Aircraft Flight Performance Laboratory** (3) III. Baughn, Sarigul-Klijn

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 125 and 128. Measurements and analysis of aircraft characteristics and performance, in flight and with flight simulator.

**135. Aerospace Structures** (3) II. Sarigul-Klijn

Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Introduction to methods used in the analysis and design of aircraft structures. Shear flow in open, closed, and multicell beam cross sections, buckling of flat and curved sheets, tension field beams, local buckling.

**137. Structural Composites** (4) I. Rehfield

Lecture—3 hours; laboratory—1 hour. Prerequisite: Engineering 104B. 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.

**138A. Aircraft Propulsion** (4) II. Hoffman

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 45, 103B, 105B. Analysis and design of modern aircraft gas turbine engines. Development and application of cycle performance prediction techniques for important engine configurations. Intro-

duction to the operation and design of inlets, compressors, burners, turbines, and nozzles. Cycle design studies for specific applications.

**138B. Aircraft Engine Systems Design (4) III.**

Hoffman

Lecture—4 hours. Prerequisite: course 138A. Presents a realistic exposure to the entire aircraft engine system requirements and to the detailed design of components. Provides a broad understanding of integrated design, and emphasizes the relationships of analytical tools, iteration, and judgment.

**161. Gas Dynamics (4) III.** Steger

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103B. Development of the governing equations, analysis of one-dimensional steady and unsteady compressible flow, shock waves, and heat addition, special forms of the governing equations, steady supersonic flow, small disturbance theory, numerical demonstration of steady and unsteady flow effects.

**198. Directed Group Study (1-5) I, II, III.** The Staff (Brandt in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Brandt in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**230. Advanced Aerodynamics-Inviscid Flow (4) II.**

Hafez

Lecture—4 hours. Prerequisite: courses 126, 127. Inviscid theory. Nonlinear effects in subsonic and supersonic flows. Transonic aerodynamics. Offered in odd-numbered years.

**232. Advanced Aerodynamics-Viscous Flow (4) I.**

van Dam

Lecture—4 hours. Prerequisite: Engineering 103B. Discussion of boundary-layer theory, laminar and turbulent boundary layers, laminar boundary-layer instability and transition, separation, viscous/inviscid interaction, three-dimensional flows and computational methods and their application. Offered in even-numbered years.

**234. Computational Aero- and Fluid Dynamics (4) III.**

Hafez

Lecture—4 hours. Prerequisite: Engineering 103B. Discretization techniques. Consistency, convergence and stability of difference schemes. Iterative methods for large nonlinear systems of equations. Applications of Euler and Navier-Stokes equations. Offered in even-numbered years.

**236. Aerodynamics In Nature and Technology (4) I.**

White

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 103B. Introduction to aerodynamics in nature, fundamentals of turbulence in atmospheric flows, planetary boundary layers, wind effects on man-made objects, pedestrian-level winds in urban areas. Criteria for laboratory modeling of atmospheric flows, wind-tunnel testing, extra-terrestrial aerodynamics. Offered in odd-numbered years.

**237. Analysis and Design of Composite Structures (4) III.** Rehfeld

Lecture—3 hours; discussion—1 hour. Prerequisite: course 137. Modeling and analysis methodology for composite structures including response and failure. Laminated plate bending theory. Introduction to failure processes.

**275. Advanced Topics in Aircraft Stability and Control (3) III.** Hess

Lecture—3 hours. Prerequisite: course 129 or Mechanical Engineering 134; and Mechanical Engineering 172. Analysis of aircraft modes of motion; response to control actuation; time and frequency domain descriptions; response to random inputs—turbulence description; autopilot and stability augmentation system design; pilot/vehicle analysis; handling qualities. Offered in even-numbered years.

**\*289A-G. Special Topics in Aerodynamics (4) III.**

van Dam

Lecture—4 hours. Prerequisite: consent of instructor.

One of the following topics: (A) Unsteady Aerodynamics and Flutter Analysis; (B) Advanced Aerodynamic Design and Optimization; (C) Wind Tunnel Testing and Wall Interference; (D) Hypersonic Flow; (E) Rarefied Gas Dynamics; (F) Atmospheric Boundary Layers; (G) Nonlinear Stability Theory and Transition to Turbulence. Offered in odd-numbered years.

**290C. Graduate Research Conference (1) I, II, III.**

The Staff (Brandt in charge)

Discussion—1 hour. Prerequisite: consent of instructor. Individual and/or group conference on problems, progress and techniques in mechanical engineering research. May be repeated for credit. (S/U grading only.)

**298. Group Study (1-5) I, II, III.** The Staff (Brandt in charge)

(S/U grading only.)

**299. Research (1-12) I, II, III.** The Staff (Brandt in charge)

Prerequisite: consent of instructor. (S/U grading only.)

**Professional Course**

**390. The Teaching of Aeronautical Science and Engineering (1) I, II, III.** The Staff

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.)

**Courses in Materials Science and Engineering**

**Upper Division Courses**

**130. Thermodynamics of Materials Processes (3) I.**

Mukherjee

Lecture—3 hours. Prerequisite: Engineering 45 and 105A (or the equivalent); upper division standing in Engineering. Application of the principles of thermodynamics to solid engineering materials with emphasis on solving problems associated with materials processes, e.g., alloying, phase stability, surface properties, semiconductor, thermoelectric power and thermionic energy conversion.

**132. Structure of Engineering Materials (3) I.**

Howitt

Lecture—3 hours. Prerequisite: Engineering 45; upper division standing. Structure of engineering materials on the atomic scale will be described by exploring the fundamentals of crystallography. The importance of this structure to materials' properties will be emphasized. Experimental determination of structure will be described using x-ray diffraction techniques.

**132L. Structure of Materials Laboratory (1) I.**

Howitt

Laboratory—3 hours. Prerequisite: course 132 concurrently. Experimental investigations of the structure of solid materials. Laboratory exercises emphasize methods used to study structure of solids at atomic and microstructural levels.

**134. Rate Processes in Materials Science (3) III.**

The Staff

Lecture—3 hours. Prerequisite: Engineering 45 and 105A or course 130. Basic kinetic laws. Theory of Absolute Reaction Rates. Applications in diffusion, nucleation, solidification, evaporation, and sintering processes.

**134L. Rate Processes in Materials Laboratory (1) III.**

The Staff

Laboratory—3 hours. Prerequisite: course 134 concurrently. Laboratory experiments to illustrate fundamental principles of diffusion, solidification, recrystallization, precipitation, evaporation, sintering and phase transformations in materials.

**138. Mechanical Behavior of Materials (3) II.**

Mukherjee

Lecture—3 hours. Prerequisite: Engineering 45 and 105A (or the equivalent); upper division standing in Engineering. Microscopic aspects of the mechanical

behavior of engineering materials are discussed with emphasis on recent developments in materials science and fracture mechanics. High temperature plastic deformation processes, strengthening mechanisms and mechanical failure modes of materials systems are outlined.

**138L. Mechanical Properties Laboratory (1) II.**

Mukherjee

Laboratory—3 hours. Prerequisite: course 138 concurrently. Experimental investigations of mechanical behavior of materials. Laboratory exercises emphasize fundamental relationships between microstructure and mechanical properties.

**140. Materials in Engineering Design (3) III.** Glibeling

Lecture—3 hours. Prerequisite: senior standing in Engineering or consent of instructor. Descriptive treatment of common engineering materials. Discussion of design parameters of typical materials including metals, ceramics, glasses, polymers, and composites. Principles of heat treatment and fabrication as they affect design parameters and applications in engineering will be emphasized.

**140L. Materials Selection Laboratory (1) III.** Glibeling

Laboratory—3 hours. Prerequisite: course 140 concurrently. Experimental investigations of processing and properties of materials used in structural applications. Laboratory exercises emphasize fundamental relationships between microstructure and properties. Consideration given to the role of property control in materials selection.

**142. Principles of Nondestructive Testing (3) II.**

The Staff

Lecture—3 hours. Prerequisite: senior standing in Engineering or consent of instructor. Basic principles of nondestructive testing using radiological, ultrasonic, electrical, magnetic, penetrant methods, etc., are discussed. Typical results expected from these tests and their application in material characterization, flaw detection, crystallographic information, chemical inhomogeneity, residual stress analysis, etc., are emphasized.

**142L. Nondestructive Testing Laboratory (1) II.**

The Staff

Laboratory—3 hours. Prerequisite: course 142 concurrently. Laboratory experience in non-destructive testing techniques with emphasis on X-ray radiography, X-ray diffraction, and ultrasonics.

**144. Corrosion and Oxidation of Engineering Materials (3) I.** The Staff

Lecture—3 hours. Prerequisite: upper division standing in Engineering. Principles governing the interaction between engineering materials and their environment; corrosion in aqueous media, soils and biological systems. Oxidation of structural materials in high temperature applications; design and selection criteria for the prevention and control of corrosion.

**144L. Corrosion Laboratory (1) I.** The Staff

Laboratory—3 hours. Prerequisite: course 144 concurrently. Laboratory experiments to demonstrate corrosion behavior of materials in aqueous and high temperature environments. Relationship between corrosion behavior and fundamental principles and theories emphasized.

**147. Principles of Polymer Materials Science (3) II.**

The Staff

Lecture—3 hours. Prerequisite: chemistry through organic or Engineering 45; introductory physics sequence. 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 Textiles and Clothing 100.)

**149. Materials Engineering Design Project (3) I, II, III.**

The Staff

Discussion—1 hour; laboratory—6 hours. Prerequisite: course 140 may be taken concurrently. A capstone engineering design experience involving analysis of real materials processes or engineering materials problems. The various principles of materials science introduced in other courses in the curriculum are integrated into the design project.

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Brandt in charge)  
Prerequisite: consent of instructor. P/NP grading only.

### Graduate Courses

**230. Fundamentals of Electron Microscopy** (3) II.

Howitt

Lecture—2 hours; discussion—1 hour. Prerequisite: Engineering 132. Principles and techniques of scanning and transmission of electron microscopy used in the study of materials. Emphasis upon practical applications. Offered in even-numbered years.

**230L. Laboratory for Electron Microscopy** (2) II.

Howitt

Laboratory—6 hours. Prerequisite: course 230 concurrently. Practical application of techniques of electron scanning and transmission microscopy including x-ray microanalysis. Offered in even-numbered years.

**232. Advanced Topics in Transmission Electron Microscopy** (3) II. Howitt

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 in odd-numbered years.

**232L. Laboratory for Advanced Transmission Electron Microscopy** (2) II. Howitt

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 232 concurrently. Laboratory in advanced transmission electron microscopy techniques relevant to specific graduate research projects in materials science. Offered in odd-numbered years.

**240. Transport Phenomena in Materials Processes** (4) II. Risbud

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Engineering. Phenomenological and atomistic mechanisms in transport processes in condensed and noncondensed phases. Application to heat treatment, chemical and physical vapor deposition, crystal growth, bonding, sintering and joining of metals. Offered in odd-numbered years.

**241. Principles and Applications of Dislocation Mechanics** (3) III. The Staff

Lecture—3 hours. 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 in even-numbered years.

**242. Advanced Mechanical Properties of Materials** (3) III. Mukherjee

Lecture—3 hours. Prerequisite: course 138 or consent of instructor. Strength and structure of engineering materials. The dependence of their mechanical properties on time, stress, and temperature. Generalized concepts of dislocation theory in plastic deformation, including fracture and creep. Influence of microstructure in optimizing the mechanical strength properties. Offered in odd-numbered years.

**243. Kinetics of Phase Transformation in Engineering Materials** (3) II. The Staff

Lecture—3 hours. Prerequisite: graduate standing in Engineering and consent of instructor; course 130 recommended. Theory of alloying, kinetics of phase changes, homogeneous and heterogeneous transformation, transformation by shear, order-disorder reactions. Offered in even-numbered years.

**244. Interaction of Materials and their Environment** (3) I. Munir

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 in even-numbered years.

**245. Advanced Topics in Structure of Materials** (4) III. Shackelford

Lecture—3 hours; discussion—1 hour. Prerequisite: course 132 and graduate standing in Engineering or consent of instructor; courses 138 and 142 recommended. Nature of microstructure in engineering materials will be explored. Crystalline and non-crystalline structures will be studied with special emphasis on grain boundary segregation in development of polycrystalline microstructure and the radial distribution function of amorphous materials. Offered in odd-numbered years.

**247. Advanced Thermodynamics of Solids** (3) I. Munir

Lecture—3 hours. Prerequisite: course 130 or the equivalent. Thermodynamics of gas-solid reactions and solutions; criteria for phase stability, thermodynamics of surfaces and interfaces; thermodynamics of defects in compounds, their influence on transport processes; thermodynamics of EMF cells and application to solid-state electrolytes. Offered in odd-numbered years.

**248. Fracture of Engineering Materials** (3) I. Glibeling

Lecture—3 hours. Prerequisite: course 138. Description of 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 in odd-numbered years.

**249. Mechanisms of Fatigue** (3) I. Glibeling

Lecture—3 hours. Prerequisite: course 138 or consent of instructor; course 248 recommended. Microstructural description of 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 in even-numbered years.

**250A-F. Special Topics in Polymer and Fiber Science** (3) II. Zeronian

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 Textiles and Clothing 250A-F.)

**290C. Graduate Research Conference** (1) I, II, III.

The Staff (Brandt in charge)

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.)

**294. Materials Science Seminar** (1) I, II, III. Shackelford, Mukherjee, Munir, Howitt, Glibeling

Seminar—1 hour. Prerequisite: graduate student in good standing. Review and discussion of current literature and developments in materials science with presentations by individual students. (S/U grading only.)

**298. Introduction to the Surface Science of Solids** (3) II. Farrens

Lecture—3 hours. Prerequisite: courses 130 and 132, or the equivalent. Thermodynamics of surfaces, terrace-ledge-kink model. Surface diffraction methods: LEED, READ, and TEM. Electron emission from surfaces; Auger, FIM, SEM, and scanning tunneling microscopy. Chemical analysis using ESCA, AES, RBS, and PIXE. Applications to thin films and coatings. Offered in even-numbered years.

**299. Research** (1-12) I, II, III. The Staff (Brandt in charge)

Prerequisite: consent of instructor. (S/U grading only.)

### Professional Course

**390. The Teaching of Materials Science** (1) I, II, III.

The Staff (Brandt in charge)

Discussion—1 hour. Prerequisite: meet qualifications for teaching assistant and/or associate-in in mechanical 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 twice for credit. (S/U grading only.)

## English

(College of Letters and Science)

\_\_\_\_\_, Ph.D., Chairperson of the Department  
Department Office, 114 Sproul Hall (916-752-2257)

### Faculty

William E. Baker, Ph.D., Professor

<sup>2</sup> Max Byrd, Ph.D., Professor

Everett Carter, Ph.D., Professor Emeritus

Christopher Craft, Ph.D., Assistant Professor

<sup>2</sup> Peter A. Dale, Ph.D., Professor

Elliot L. Gilbert, Ph.D., Professor

Sandra M. Gilbert, Ph.D., Professor

Thomas A. Hanzo, Ph.D., Professor Emeritus

Wayne Harsh, Ph.D., Professor (*English, Linguistics*)

Emeritus

John O. Hayden, Ph.D., Professor

<sup>2</sup> Peter L. Hays, Ph.D., Professor

W. Jack Hicks, Ph.D., Associate Professor

Michael J. Hoffman, Ph.D., Professor

<sup>1</sup> Robert H. Hopkins, Ph.D., Professor

Michael P. Kramer, Ph.D., Assistant Professor

Richard A. Levin, Ph.D., Associate Professor

<sup>3</sup> Kari E. Lokke, Ph.D., Assistant Professor

Clarence Major, Ph.D., Professor

Arthur E. McGuinness, Ph.D., Professor

<sup>2</sup> Sandra J. McPherson, B.A., Professor

<sup>3,4</sup> Patricia L. Moran, Ph.D., Assistant Professor

Linda A. Morris, Ph.D., Lecturer

James J. Murphy, Ph.D., Professor

Marijane Osborn, Ph.D., Associate Professor

David A. Robertson, Ph.D., Associate Professor

Winfried Schleiner, Ph.D., Professor

Gwendolyn Schwabe, M.A., Senior Lecturer

Karl J. Shapiro, Professor Emeritus

<sup>2</sup> Daniel Silvia, Ph.D., Associate Professor

Gary Snyder, B.A., Professor

Margit K. Stange, Ph.D., Assistant Professor

Elizabeth Tallent, B.A., Associate Professor

<sup>2</sup> David Van Leer, Ph.D., Associate Professor

Raymond B. Waddington, Ph.D., Professor

Brom Weber, Ph.D., Professor of American Literature

Emeritus

Alan B. Williamson, Ph.D., Professor

James L. Woodress, Ph.D., Professor Emeritus

Celeste T. Wright, Ph.D., Professor Emeritus

Karl F. Zender, Ph.D., Professor

### The Major Program

The study of English develops skills in reading analytically and perceptively and in writing clearly and with effect; thus it is a preparation for careers in writing, teaching, and editing, or for any role in which clear communication is important. The program offers its majors several options. A student majoring in English may elect the general study of English and/or American literature or may choose to emphasize Teaching or Writing.

Faculty-student interaction is encouraged by participation in the English Club, which meets once a quarter, often in a faculty home. Qualified creative writing students may gain valuable experience for academic credit by helping to edit the Department's nationally known *California Quarterly*.

### A.B. Degree Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	24
English 45 .....	4
English 30A, 30B, 46A, 46B, 46C .....	20
<b>Depth Subject Matter</b> (for each emphasis, see below) .....	44
<b>Core requirement</b> .....	28

A. Historical Periods .....	16
One course each in four of the following five areas	
1) British literature, beginnings to 1500: English 111, 150A	
2) British literature, 1500-1660: English 116, 120, 150B	
3) British literature, 1660-1800 or American literature, 1620-1800: English 125, 127, 140, 141, 155A	
4) Nineteenth-century British or American literature: English 130, 132, 133, 134, 143, 144, 155B, 155C, 158A	
5) Twentieth-century British or American literature: English 136, 137, 138, 139, 146, 147, 150D, 152, 155D, 158B, 160, 179, 181	
B. Major Authors .....	8
Two courses in different authors selected from English 113A, 113B, 117A, 117B, 117C, 122. Courses used to meet this requirement may not duplicate courses chosen to meet the historical periods requirement.	
C. Senior Seminar .....	4
One course selected from English 187, 188, 189.	
The following courses—English 107, 110A, 110B, 156, 160, 162, 171A, 171B, 173, 175, 177, 179, 180, 181, 182, 184, 185, 187, 188, 189, 198, and 199—are designed for studying a special subject, one that may be fairly constant in format (as with English 110A, 110B, 156, 160, 162, 171A, 171B, 173, 175, 177, 179, 180, 181, 185) or one that may vary each time the course is offered (as with English 107, 187, 188, 189, 198, 199). These special subject courses may satisfy core requirements and/or emphasize core requirements; in order to ascertain the applicability of one of these courses to the major, you should consult with an adviser.	
<b>General Major</b>	
<b>Depth Subject Matter .....</b>	<b>44</b>
Core requirements (see above) .....	28
One course from language/linguistics group: English 105A, 105B, 105C, 105D, 107 .....	4
Twelve elective units in upper division English courses .....	12
<b>Total Units for the Major .....</b>	<b>68</b>
<b>Teaching Emphasis</b>	
<b>Depth Subject Matter .....</b>	<b>44</b>
Core requirement, same as for (General) major above, but must include one course from English 117A, 117B, or 117C .....	28
English 103A-G, 105A, 105B .....	12
One course selected from English 179, 181, or an ethnic literature course from outside the English department .....	4
<b>Total Units (Teaching Emphasis) .....</b>	<b>58</b>
<b>Writing Emphasis</b>	
<b>Depth Subject Matter .....</b>	<b>44</b>
Core requirement, same as for (General) major above .....	28
One course from the language and linguistics group: English 105A, 105B, 105C, 105D, 107 .....	4
Twelve units in English 100F, 100P and/or 100NF .....	12
<b>Total Units (Writing Emphasis) .....</b>	<b>68</b>
<b>English Majors</b>	
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.	

## Minor Program Requirements:

	UNITS
<b>English .....</b>	<b>20</b>
Five upper-division courses, four of which will be literature courses .....	20

**Campus Writing Center.** The Campus Writing Center, an affiliate of the English Department, is a program designed to provide writing instruction across the curriculum. Of special interest to students are its adjunct writing courses, which are offered to students who are simultaneously enrolled in specified courses in other disciplines. Topics of instruction and writing assignments in each adjunct course all relate to the subject matter of the companion course. These are credit-bearing courses offered in conjunction with both lower and upper division courses in agriculture, engineering, and letters and sciences. Interested students and faculty should contact the Campus Writing Center, telephone 916-752-8024, for the current schedule of courses.

**Subject A.** Students must have passed the Subject A requirement before taking any course in English.

**Prerequisites.** English 1 or 3 is required for admission into courses 30A, 30B, 45, 46A, 46B, 46C, and all upper division courses. Course 45 is recommended as preparation for the 30 and 46 series. Students taking course 30A, 30B, 45, 46A, 46B, or 46C for General Education credit may substitute Comparative Literature 1, 2, or 3 for English 1 or 3.

**Meeting for Majors.** All English majors are required to attend a general meeting for majors at the beginning of each year; all new and transfer English majors are required to attend a general meeting for majors at the beginning of their first quarter in residence; all English majors must see their advisers, individually, in the spring quarters of their sophomore and junior years.

**Major Advisers.** W.E. Baker, W.M. Byrd, C. Craft, P.A. Dale, E.L. Gilbert, S.M. Gilbert, J.O. Hayden, P.L. Hays, W.J. Hicks, M.J. Hoffman, R.H. Hopkins, M.P. Kramer, R.A. Levin, K.E. Lokke, C. Major, A.E. McGuinness, S.J. McPherson, P.L. Moran, L.A. Morris, M. Osborn, W. Schleiner, D. Silvia, M.K. Stange, E. Tallent, D. Van Leer, R.B. Waddington, A.B. Williamson, K.F. Zender.

**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.

**Honors and Honors Program.** The honors program consists of four units of 194H and four units of 195H, normally taken during the fall and winter quarters 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 Office, 222 Sproul Hall. Refer to the Academic Information section and the College section for Dean's Honors List information.

**Teaching Credential Subject Representative.** G.T. Schwabe. See also under Teacher Education Program.

**Graduate Study.** The Department of English offers programs of study and research leading to the M.A. and Ph.D. degrees. Detailed information may be obtained from the graduate adviser or the Chairperson of the Department.

**Graduate Adviser.** D.A. Robertson.

## Courses in English

### Lower Division Courses

**A. Language Skills (2) I, II, III.** The Staff (Chairperson in charge)

Lecture-discussion—4 hours. Introductory course to help students gain writing proficiency required for successful University-level work. Focus on critical thinking, reading, and writing; on the fundamentals of essay writing; and on the relationship between writing mechanics and coherent thought. This course must be taken for a letter grade. Minimum passing

grade is a C; students receiving a C- or below must repeat course. Satisfies Subject A requirement. (Counts as 4 units toward minimum progress.)

**R. Communications Skills Workshop (0) I, II, III.**

The Staff (Chairperson in charge)

Lecture—4 hours; workshop—2 hours; reading laboratory—1 hour. Workshop in language skills for students from non-standard-English backgrounds who need to strengthen basic skills before taking English A. Course worth 6 units toward minimum study list requirement. (P/NP grading only.)

**1. Expository Writing (4) I, II, III.** The Staff (Chairperson in charge)

Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments will be made. (CAN Engl 2)

**3. Introduction to Literature (4) I, II, III.** The Staff (Chairperson in charge)

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A 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. General Education credit: Civilization and Culture/Introductory.

**4. Critical Inquiry and Literature: Freshman Seminar (4) I, II, III.** The Staff (Chairperson in charge)

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. General Education credit: Civilization and Culture/Introductory.

**5F. Introduction to Creative Writing: Fiction (4) I, II, III.** The Staff (Chairperson in charge)

Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing fiction. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination.

**5P. Introduction to Creative Writing: Poetry (4) I, II, III.** The Staff (Chairperson in charge)

Lecture-discussion—4 hours. Prerequisite: completion of Subject A requirement. The elementary principles of writing poetry. Students will write both in prescribed forms and in experimental forms of their own choosing. No final examination.

**20. Intermediate Composition (4) I, II, III.** The Staff (Chairperson in charge)

Lecture-discussion—4 hours. Prerequisite: course 1 or 3. Emphasis on the grammatical patterns of standard English, sentence revision techniques, development of coherent paragraphs, and the formal properties of the expository essay.

**21. Introduction to Reading and Composition in ESL (5) I, II.** The Staff (Chairperson in charge)

Lecture-discussion—5 hours. Prerequisite: enrollment by placement examination only. Course provides undergraduate students whose native language is not English with intensive work in reading for factual information and in writing organized, coherent, and grammatically correct paragraphs. Students also study elements of the academic essay. (P/NP grading only.)

**22. Reading and Composition in ESL (4) I, II, III.**

The Staff (Chairperson in charge)

Lecture-discussion—4 hours. Prerequisite: enrollment by placement examination or by successful completion of course 21. Course provides undergraduate students whose native language is not English with experience in writing complete short essays in recognized rhetorical modes, such as definition, comparison, and analysis. Students also read for reference and work on sentence structure. (P/NP grading only.)

**23. Advanced Reading and Writing in ESL (4) I, II, III.**

The Staff (Chairperson in charge)

Lecture-discussion—4 hours. Prerequisite: enroll-

ment by placement examination or by successful completion of course 22. Course provides students whose native language is not English with experience with the conventions of English language logic and with writing persuasive essays. Students also asked to read for tone, style, context, and assumptions. (P/NP grading only.)

**25. English for Foreign Students (5) I, II, III.**

Schwabe

Lecture—3 hours; laboratory—4 hours. Prerequisite: enrollment by examination in English placement; open to international graduate students only. Course develops skills needed by the graduate student: note-taking on lectures and on written academic discourse, writing logically developed essays accurately under time pressure, using thinking strategies implicit in objective testing, systematically extending vocabulary, and writing a research paper.

**26. English for Foreign Students (5) II, III.**

Schwabe

Lecture—3 hours; laboratory—4 hours. Prerequisite: satisfactory completion of course 25; open to international graduate students only. Continuation of work in course 25, with additional focus on oral skills.

**28. Introduction to Library Research (2) I, II, III.**

Library staff (Chairperson in charge)

Lecture—1 hour, practicum—3 hours. Methodology of research in libraries: catalogs, indexes and abstracts, bibliographies, computers, reference books, specialized sources. Emphasis on preparation of detailed bibliographies for term papers, reports; offered in conjunction with campus libraries. (P/NP grading only.)

**30A. Survey of American Literature (4) I. ———;**

II. Kramer; III. Van Leer

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. American literature from the seventeenth century to 1865. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List. (CAN Engl 14)

**30B. Survey of American Literature (4) I. ———;**

II. ———; III. Stange

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. American literature from 1865 to the present. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List. (CAN Engl 16)

**45. Close Reading of Poetry (4) I, II, III. The Staff**

(Chairperson in charge)

Lecture-discussion—4 hours. Prerequisite: course 1 or 3. Close reading of selections from English and American poetry. Frequent written exercises. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**46A. Masterpieces of English Literature (4) I.**

Schleiner; II. ———

Lecture—3 hours; discussion—I hour. Prerequisite: course 1 or 3. Selected works of principal writers to 1640. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List. (CAN Engl Seq B)

**46B. Masterpieces of English Literature (4) II. Hayden; III. ———**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 1640 to 1832. History of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List. (CAN Engl Seq B)

**46C. Masterpieces of English Literature (4) I, III.**

Craft

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 3. Selected works of principal writers from 1832 to present. The history of literary conven-

tions and backgrounds in religious thought, intellectual and social history, and related art forms. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List. (CAN Engl Seq B)

**92. Internship in English (1-12) I, II, III. The Staff**

(Chairperson in charge)

Fieldwork—3-36 hours. Prerequisite: course 1 or 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) I, II, III. The Staff**

(Chairperson in charge)

Prerequisite: one course from 1 or 3. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5) I, II, III.**

The Staff (Chairperson in charge)

(P/NP grading only.)

**Upper Division Courses**

**100F. Creative Writing: Fiction (4) I, II, III. The Staff**

(Chairperson in charge)

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.

**100NF. Creative Writing: Non-Fiction (4) I, II. Hicks**

Discussion—4 hours; development and evaluation of written materials, and conferences with individual students. Prerequisite: course 1 or 3, 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) I, II, III. The Staff**

(Chairperson in charge)

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 poetry. May be repeated for credit with consent of instructor. No final examination.

**102. Adjunct Writing (3) I, II, III. The Staff (Chairperson in charge)**

Discussion—3 hours. Prerequisite: course 1 or 3; concurrent enrollment in a specified course in a subject-matter discipline. Instruction in the elements of expository writing, with special emphasis on their application to writing projects in a specified academic discipline. May be repeated once for credit if taken in conjunction with a different subject-matter course.

**103A-G. Advanced Composition (4) I, II, III. The Staff**

(Chairperson in charge)

Lecture-discussion—3 hours; individual evaluations and conferences. Prerequisite: course 1 or 3; course 20 recommended. Instruction and practice in a variety of modes of composition. Frequent written assignments. One area required of teaching credential candidates (section "F" strongly recommended). Study areas are: (A) General; (B) Legal Writing; (C) Article Writing; (D) Report Writing; (E) Technical Writing; (F) Composition for Elementary and Secondary Teachers; (G) Pre-Professional Writing. May be repeated once for credit in different area of emphasis.

**104. Scientific Writing (1-3) I, II, III. The Staff (Chairperson in charge)**

Lecture—2 hours; discussion—1 hour. Prerequisite: upper division enrollment in a science curriculum. Analysis and practice of scientific writing; research methods, organization, proper style and format, oral presentation of scientific papers. Lecture and workshop-discussions by English and science department staff. May be repeated for a total of 4 units of credit. (P/NP grading only.)

**105A. Language (4) I, II.**

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Present-day English grammar and pronunciation according to the perspectives of traditional grammar and contemporary linguistics. Preparation for stylistic analysis and historical study

of English language and literature. Required of teaching credential candidates.

**105B. Language (4) II.**

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. 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. Required of teaching credential candidates.

**\*105C. Language Change Reflected in Literature (4) III.**

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of literary texts from the various historical periods in the English language, considering, in addition to other stylistic features, those characteristics particularly connected with development and change in the respective linguistic periods.

**\*105D. Linguistics, Literature, and Composition (4)**

Lecture-discussion—3 hours; term paper. Prerequisite: courses 105A and 105B. Linguistic theories and methods in literary analysis and in composition. Course considers structural linguistics and transformational grammar exemplified in analysis, criticism, and content of belletristic and non-belletristic written materials.

**\*107. Special Topics in English Language (4)**

Seminar—3 hours; special project. Prerequisite: course 1 or 3. Investigation of varied subjects in contemporary and historical English language studies. May be repeated for credit when a different topic is studied.

**\*110A. Introduction to Principles of Criticism (4) I.**

Hayden

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Essentials of literary criticism and its history from Aristotle to the modern era, with emphasis on the major critics.

**\*110B. Introduction to Principles of Criticism (4) I.**

Hayden

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. 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.

**111. Medieval Literature (4) I. ———; III. Osborn**

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Major types, traditions, and conventions of literature in England from the time of *Beowulf* to the late medieval romances, with special emphasis on the heroic strain, courtly love and its impact, and the development of Arthurian literature. Mostly in translation.

**113A. Chaucer: *Troilus and the "Minor" Poems* (4) II. Silvia**

Lecture—3 hours; term paper. Prerequisite: course 1 or 3. Development of the poet's artistry and the evolution of the poet's ideas from his first work to his culminating masterpiece, *Troilus and Criseyde*. Courses 113A and 113B need not be taken in sequence.

**113B. Chaucer: *The Canterbury Tales* (4) I. ———**

Lecture—3 hours; term paper. Prerequisite: course 1 or 3. *The Canterbury Tales* complete as a work of art. Courtly love, literary forms, medieval science and astrology, theology and dogma as they inform the reading of Chaucer. Courses 113A and 113B need not be taken in sequence.

**116. Sixteenth-Century Poetry and Prose (4) II.**

Levin

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Poetry of Skelton, Wyatt, Surrey, Sidney, Spenser, Marlowe, and Shakespeare; selected discursive prose and fiction. Political, religious, and intellectual background.

**117A. Shakespeare: The Early Works (4) II. Zender**

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works from Shakespeare's early period, up to 1599. Courses 117A-117B-117C need not be taken in sequence.

**117B. Shakespeare: The Middle Period (4) I.**

Schleiner; II. Waddington; III. Zender

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works from Shakespeare's middle period, up to 1604. Courses 117A-117B-117C need not be taken in sequence.

**117C. Shakespeare: The Later Works (4)** I. Levin; III. Schleiner  
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works from Shakespeare's later period. Courses 117A-117B-117C need not be taken in sequence.

**118. Shakespeare (4)** I. \_\_\_\_\_  
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works by Shakespeare. Recommended for non-majors. May not be applied toward the English major. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**120. Earlier Seventeenth-Century Poetry and Prose (4)** I. Levin

Lecture-discussion—3 hours; term paper or the equivalent. Prerequisite: course 1 or 3. Major authors, forms, and styles. Donne, Jonson, Marvell, Bacon, Browne, Hobbes. Tradition and revolution.

**122. Milton (4)** III. Waddington

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Selected major works, including *Paradise Lost*.

**\*125. The Age of Swift and Pope: Prose and Poetry (4)**

Lecture-discussion—3 hours; term paper or the equivalent. Prerequisite: course 1 or 3. The Augustan Age: reason and imagination. Readings in Swift, Addison, Steele, Defoe, Pope, Gay, Thomson, and others.

**127. Prose and Poetry of the Later Eighteenth Century (4)** III. Byrd

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Readings in Johnson, Goldsmith, Boswell, and others; the poetry of the era concluding with Blake. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**130. Early Romantic Literature (4)** I. Hayden

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Blake, Burns, Wordsworth, Coleridge, Scott; the eighteenth-century background and the development of Romantic concepts of imagination.

**132. Later Romantic Literature (4)** III. Lokke

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Byron, Shelley, Keats. Individualism and revolt.

**133. Early Victorian Literature (4)** II. Dale

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Tennyson, Browning, Arnold, and selected prose writers. The Victorian temper; the individual and society, the search for faith. The impact of scientific thought upon creative thinkers.

**134. Later Victorian Literature (4)** I. \_\_\_\_\_

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Ruskin, Hardy, Hopkins, and others. The Oxford movement, the Pre-Raphaelites; art and sociology; aestheticism and decadence; pessimism. Tendencies continuing into the Edwardian period.

**\*136. British Literature from 1880 to 1918 (4)**

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Yeats, Conrad, Joyce. Aestheticism, naturalism, symbolism, and impressionism. Transition from Victorian to twentieth-century styles and attitudes.

**137. British Literature from 1918 to 1940 (4)** I. Moran

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Lawrence, Eliot, Forster, and others. Post-war attitudes. Modern psychology and the awareness of myth.

**138. British Literature from 1940 to the Present (4)** II. Williamson

Lecture-discussion—3 hours; term paper. Prerequisite:

site: course 1 or 3. Literature of England and Ireland from World War II to the present. Major themes in the novel, poetry, and short story.

**\*139. Modern Anglo-Irish Writers (4)**

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. A study of Yeats, Joyce, George Moore, John Synge, James Stephens and others.

**140. Origins of American Literature (4)** II. Kramer

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Seventeenth-century American literature; special attention to European literary-intellectual traditions, dominant American forms (poems, sermon, history), and major writers (Anne Bradstreet, Edward Taylor, and others).

**141. The American Enlightenment and Its Reaction (4)** I. \_\_\_\_\_

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Eighteenth-century American literature; rise of neoclassicism, liberal religion, popular literature, scientific thought, satiric tempers; decline of Puritan traditions; major writers, including Franklin, Edwards, Freneau, and Brackenridge.

**143. Aspects of American Romanticism (4)** II. Van Leer

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Flowering of American romanticism; the metaphysical tradition, Oriental and European antecedents, philosophical idealism and literary achievement of Transcendentalism (Emerson, Thoreau, Whitman); the critical tempers of Hawthorne and Melville; Emily Dickinson.

**144. American Literature from 1865 to 1914 (4)** III. Morris

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Religion, local color, social criticism, naturalism, *fin de siècle* aestheticism; Twain, James, Crane, Dreiser, Howells.

**146. Modern American Literature: 1914-1940 (4)** I. Zender

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. The Modernist movement, disillusionment, artistic experimentalism, classical revival, New Criticism, proletarian literature, romantic nationalism, European currents; Pound, Fitzgerald, Eliot, Frost, Hemingway, Crane, Faulkner, and Stevens.

**147. Modern American Literature: 1940 to the Present (4)** III. Hicks

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Contemporary fiction, poetry, and drama. The impact of World War II on the younger writers; experimentation and formalism in poetry and the drama.

**150A. English Drama to Marlowe (4)** II. \_\_\_\_\_

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Development of the drama from its beginnings to the Renaissance. Miracle and mystery plays; the morality tradition. Early comedy, tragedy, and chronicle plays.

**150B. English Drama from Marlowe to 1642 (4)** I. Waddington

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Shakespeare's contemporaries in the drama, including Webster, Jonson, Beaumont and Fletcher, and others. The revenge play and tragicomedy; post-Shakespearean development of dramatic action and blank verse.

**150D. British Drama from 1890 to the Present (4)**

III. McGuinness

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. The rise of dramatic realism; the chief reactions against it. Emphasis on Shaw, O'Casey, Osborne.

**152. American Drama from Its Beginnings to the Present (4)** III. Hays

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Critical and historical survey of drama in America from its eighteenth-century origins with emphasis on O'Neill, Williams, Miller, and others.

**155A. The English Novel: 1700-1770 (4)** II. Byrd

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Realism and the rise of the modern novel. Defoe, Richardson, Fielding, Sterne, and

Smollett.

**155B. The English Novel: 1770-1850 (4)** II. Dale

Lecture—3 hours; extensive writing (includes 5 two-page position papers). Prerequisite: course 1 or 3. Evolution of the novel from 1770-1850 with particular emphasis on the invention of the Gothic novel (Radcliffe, Mary Shelley), invention of the historical novel (Sir Walter Scott), and contribution of women writers to fiction (Jane Austen, Emily, Charlotte, and Anne Bronte).

**155C. The English Novel: 1850-1900 (4)** III. Dale

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Major Victorian novelists: their theory and practice. Dickens, Thackeray, Trollope, Eliot, Meredith, and Hardy.

**155D. The English Novel: 1900 to the Present (4)**

II. Craft

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Major figures including Conrad, Joyce, and Lawrence. Impressionism, the revolt against naturalism; the experimental novel; the anti-modernist reaction.

**\*156. The Short Story (4)**

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. The short story as a genre; its historical development, techniques, and formal character as a literary form. European as well as American writers. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**158A. The American Novel to 1900 (4)** I. Stange

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Rise and development of the American novel from its beginnings. Hawthorne, Melville, Twain, and others.

**158B. The American Novel from 1900 to the Present (4)** II. Hays

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Major American novelists of the twentieth century. Faulkner, Hemingway, Fitzgerald, and others.

**160. Film As Narrative (4)** III. Silvia

Discussion—2 hours; lecture and film study—3 hours. Prerequisite: course 1 or 3. Study of modern film (1930 to the present) as a storytelling medium.

**162. Film Theory and Criticism (4)** II. \_\_\_\_\_

Lecture—1 hour; discussion—2 hours; laboratory—3 hours. Prerequisite: course 1 or 3. Film theory and criticism, with a study of ten major works of international film art. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**171A. The Bible as Literature: The Old Testament (4)** I, III. Robertson

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. 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. Offered in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4A, 4B, 4C, Philosophy 1, 10B, Religious Studies 21, 40, or any course from the GE Literature Preparation List.

**\*171B. The Bible as Literature: Prophets and New Testament (4)** I. Robertson

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. May be taken independently of course 171A. Selected readings from the Old Testament prophets and the New Testament. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4A, 4B, 4C, Philosophy 1, 10B, Religious Studies 21, 40, or any course from the GE Literature Preparation List.

**\*173. The Literature of Science Fiction (4)**

Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of the literary modes and methods of science fiction. The course will analyze

representative novels and short stories which exemplify major themes and styles in this genre—e.g., time travel; alternative universes; utopian, anthropological, sociological science fiction.

**\*175. American Literary Humor** (4) I. Morris  
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3, 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.

**177. Study of an Individual Author** (4) II, III. The Staff (Chairperson in charge.)  
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Survey of the works of an individual author other than Chaucer, Shakespeare, or Milton. May be repeated for credit when a different author is studied.

**179. Multi-Ethnic Literature** (4) III. Kramer  
Lecture-discussion—3 hours; papers. Prerequisite: course 1 or 3, or standing above freshman level. Fiction, poetry, and other writings by Americans of ethnic minority background (Native, Black, Hispanic, Jewish, Italian, etc.) which reveal their immigrant experience, cultural diversity, and contributions to American literature.

**180. Children's Literature** (4) I. ———  
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Historical backgrounds and development of types of children's literature, folklore and oral tradition, levels of interest, criticism and evaluation, illustration and bibliography.

**181. Black Literature** (4) I. Morris  
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. A study of the writings of black Americans, including Chesnutt and Dunbar in the nineteenth century, the writings of the Harlem Renaissance in the twentieth century, and the more important contemporary black writers, such as Wright, Ellison, Baldwin, Hansberry, and Jones.

**\*182. Literature of California** (4)  
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. 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. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: English 3, Comparative Literature 1, 2, or 3.

**184. Literature of the Wilderness** (4) III. Snyder  
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. Study of the theme of wilderness primarily in American Literature, with some consideration of Biblical and European antecedents. Major attention given to Thoreau, Muir, London, Austin, Faulkner, Snyder, and Abbey. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: English 3, History 17A, or 17B.

**185. Literature by Women** (4) II. ———; III. S. Gilbert  
Lecture-discussion—3 hours; term paper. Prerequisite: course 1 or 3. English language literature by women from Bradstreet and Behn to the Brontes, Eliot, Woolf, Plath, and Rich. The effects of social constraints upon women's art; the rise of feminism; new trends in literary criticism.

**187. Literature and the Other Arts** (4) III. Stange  
Seminar—3 hours; term paper. Prerequisite: junior or senior standing with a major in English or consent of instructor. Group study of the relationship between the forms of literature and the forms of the other arts, with detailed study of one of the crucial periods of artistic development in western culture.

**188. Special Topics In Literary Studies** (4) I, II, III.  
The Staff (Chairperson in charge)  
Seminar—3 hours; term paper. Prerequisite: junior or senior standing with a major in English or consent of

instructor. Group study of a special topic drawn from English or American literature. Course will be offered in sections according to the topic studied, and papers will be assigned. Limited enrollment. May be repeated for credit with consent of instructor.

**189. Seminar in a Major Writer** (4) I, II, III. The Staff (Chairperson in charge)  
Seminar—3 hours; term paper. Prerequisite: junior or senior standing; a major in English or consent of instructor. One major writer's artistic development with attention to intellectual and literary milieu. Limited enrollment. May be repeated for credit with consent of instructor.

**192. Internship in English** (1-12) I, II, III. The Staff (Chairperson in charge)  
Field work—3-36 hours. Prerequisite: course 1 or 3. Internships in fields where students can practice their skills. A maximum of 4 units is allowed toward the major in English. May be repeated for credit for a total of 12 units. (P/NP grading only.)

**194H. Special Study for Honors Students** (4) I. The Staff (Chairperson in charge)  
Seminar—3 hours; term paper. Prerequisite: admission to English Department Senior Honors Program. Study of a special literary topic or of the works of a major writer, and preparation for writing an honors thesis in course 195H.

**195H. Honors Thesis** (4) II. The Staff (Chairperson in charge)  
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.

**197T. Tutoring In English** (1-5) I, II, III. The Staff (Chairperson in charge)  
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 for credit for a total of 8 units. (P/NP grading only.)

**197TC. Community Tutoring in English** (1-4) I, II, III. The Staff (Chairperson in charge)  
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.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: one course from courses 1, 3, 5F, 5P. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

#### Graduate Courses

**200. Techniques of Literary Scholarship** (4) II.  
Waddington

Discussion—3 hours; term paper. The elements of bibliography with special attention to literature and discussion of the principal modes of literary investigation—critical, historical, textual, and others.

**201. Literary Criticism** (4) Torrance  
Discussion—3 hours; term paper. Survey of the major critics from Aristotle to the present, with emphasis on the relationship of critical theory to the history of literature.

**\*203. Theory and Practice of Written Composition** (4)  
Seminar—3 hours; practical exercise of writing and tutorial assignments. Students admitted into this course by examination of their own writing skills. (Those with insufficient advanced command of writing shall be required to take a special section of course 103, at no credit, before enrolling in course 203.) Instruction in the teaching of composition. Emphasis on mastering both the basics and finer points of expository prose and on teaching such

skills to others.

**205. Introduction to Old English** (4) I. Osborn  
Discussion—3 hours; written reports; individual conferences. The language of Anglo-Saxon England; readings in Old English prose and poetry.

**206. Beowulf** (4) III. Osborn  
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 odd-numbered 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.

**\*208. Present-Day English Linguistics** (4)  
Discussion—3 hours; term paper. Theory and methods of structural linguistics and transformational grammar as applied to the analysis of English. Emphasis will be on recent linguistic techniques, particularly as these relate to the teaching of language, literature, and composition.

**\*210. Readings in English and American Literature** (4)

Seminar—3 hours; conference—1 hour. Prerequisite: upper division English course in area to be studied. Offered in multiple sections each quarter. Content varies according to specialty of instructor. Course designed for students preparing for their comprehensive examinations. May be repeated for credit.

**\*215. Arthurian Romance** (4)  
Seminar—3 hours; conference—1 hour. The sources of Arthurian Romantic literature. Continental and English literary treatment; Malory's synthesis; significant changes of attitudes in post-Malory literature.

**225. Topics in Irish Literature** (4) I. McGuinness  
Seminar—3 hours; conference—1 hour. Prerequisite: course 139. Course will vary from quarter to quarter and will include such topics as the nineteenth-century novel, contemporary Irish poetry, rise of the drama, or a study of a major author.

**230. Study of a Major Writer** (4) III. Hays  
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.

**233. Problems In American Literature** (4) I.  
Kramer, Robertson; III. Silvia  
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) II. Cohn (Dramatic Art)  
Seminar—3 hours; conference—1 hour. Historical introduction to dramatic theory; the genres of tragedy, comedy, and tragicomedy.

**235. Theory of Fiction** (4) III. Tallent  
Seminar—3 hours; preparation and evaluation of paper on a work of fiction. Theories of fiction as they relate to the professional writer's practice of the craft. Designed for students in the creative writing program.

**236. Poetics** (4) I. Major  
Seminar—3 hours; conference—1 hour. Structure, prosody, and idiom of British and American poetry variably approached—sometimes through an intensive study of a single writer; sometimes historically or theoretically—at the instructor's discretion. Preparation and evaluation of research papers. Directed toward Creative Writing master's degree students.

**237. Modern Critical Theory** (4) I. Hoffman  
Seminar—3 hours; conference—1 hour. Examination

of problems in the theory underlying the practice of literary criticism from I.A. Richards and T.S. Eliot to the present.

**238. Special Topics in Literary Theory (4) III. Van Leer**

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 even-numbered years.

**240. Medieval Literature (4) II. Murphy**

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) II. Schleiner**

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) I. Waddington**

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) II. Byrd**

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) I. Lokke**

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.

**252. Victorian Literature (4) II. Craft; III. Dale**

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) II. Strange**

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) I. Williamson; II. Hicks**

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) I. Moran**

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.

**\*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 a topic and/or reading list differs.

**290F. Seminar in Creative Writing of Fiction (4) I, II, III. The Staff (Chairperson in charge)**

Seminar—3 hours; 1 additional hour of writing. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in master's program in Creative Writing. Writing of prose. Evaluation of written materials and individual student conferences. May be repeated for credit.

**290NF. Seminar in Creative Writing of Non-Fiction (4) I, II, III. The Staff (Chairperson in charge)**

Seminar—3 hours; term paper. Prerequisite: consent of instructor; graduate standing, with preference given to those enrolled in the Master's Program in English (Creative Writing). A workshop in the writing of literary non-fiction, with emphasis — according to staff and student interest — on autobiography, biography, memoir, the occasional or nature essay, or other non-fiction prose narratives.

**290P. Seminar in Creative Writing of Poetry (4) I, II, III. The Staff (Chairperson in charge)**

Seminar—3 hours; 1 additional hour of writing. 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.

**298. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

(S/U grading only.)

**298C. Colloquium on Literary Scholarship (1-4) I, II, III. The Staff (Chairperson in charge)**

Oral presentation and critique of research papers. (S/U grading only.)

**299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)**

(S/U grading only.)

**299D. Special Study for the Doctoral Dissertation (1-12) I, II, III. The Staff (Chairperson in charge)**

(S/U grading only.)

**Professional Courses**

**300. Problems in Teaching English Language, Literature, and Composition in Secondary Schools (3) I. Kraemer**

Lecture-discussion—3 hours. Prerequisite: senior or graduate standing; an English teaching major or minor. This course should be completed before practice teaching. Course is accepted in partial satisfaction of the requirement in education for the general secondary credential.

**302. Materials of Teaching English as a Second Language (ESL) (4) II. Schwabe**

Lecture—3 hours; practice teaching—3 hours. Prerequisite: Linguistics 300. Design and development of classroom curricula and surveying/evaluating ESL materials combined with instructing classes in the ESL Clinic. Guided practice in teaching English pronunciation, grammar and sentence structure, listening comprehension and composition, discussion, and reading to foreign students.

**303. Recent Research and Problems in ESL (4) III. Schwabe**

Lecture—1 hour; practice teaching—2, 4, or 6 hours. Prerequisite: course 302. Analysis of a particular problem in teaching English as a second language

(ESL) and testing possible solutions. Course work will include a review of literature in this area as well as presentation of a paper addressing problem/solution.

**390. Teaching English at the College Level (4) I, III.**

Lecture—2 hours; discussion—2 hours. Prerequisite: graduate standing. Consideration of the problems and techniques of teaching composition and literature at the college level. (S/U grading only.)

**391. Oral English for ESL Students (3) II, III. The Staff (Schwabe in charge)**

Lecture—2 hours; laboratory—2 hours. Prerequisite: open only to non-native English-speaking students with priority enrollment to foreign student teaching assistants; completion of any required ESL courses or consent of instructor. Intensive work in oral English to increase fluency and accuracy plus use of appropriate discourse strategies in academic settings (i.e., seminar, discussion, laboratory). (S/U grading only.)

**392. Teaching Internship In English (4) I, II, III.**

(Coordinator of Writing Programs in charge) Supervised internships—4 hours. Prerequisite: graduate standing. In-class internship with English Department faculty member. (S/U grading only.)

**\*393. Problems In Teaching College Composition (2) I, II, III. The Staff (Chairperson in charge)**

Discussion—2 hours. Prerequisite: open to graduate students teaching composition in a variety of University courses including English A, 1, 3, 5, 20, 102, and 103. Designed for the relatively experienced student teacher who would profit from developing skills in specific areas. (S/U grading only.)

**401. Editing California Quarterly (2) I, II, III. Gilbert**

Seminar—2 hours; conference—1 hour. Prerequisite: participation in Creative Writing Program. Students will read all manuscripts submitted to *California Quarterly* and attend weekly editorial board meetings, choosing manuscripts for publication. They will also participate in copy-editing, copy-reading, layout, and other aspects of journal production. May be repeated for a total of 6 units. (S/U grading only.)

## Entomology

(College of Agricultural and Environmental Sciences)

Jeffrey Granett, Ph.D., Chairperson of the Department

Department Office, 367 Briggs Hall (916-752-0475)

### Faculty

Oscar G. Bacon, Ph.D., Professor Emeritus

Richard M. Bohart, Ph.D., Professor Emeritus

James R. Carey, Ph.D., Associate Professor

Hugh Dingle, Ph.D., Professor

Sean S. Duffey, Ph.D., Professor

Lester E. Ehler, Ph.D., Professor

Bruce F. Eldridge, Ph.D., Professor

Norman E. Gary, Ph.D., Professor

Jeffrey Granett, Ph.D., Professor

Albert A. Grigarick, Jr., Ph.D., Professor

Bruce D. Hammock, Ph.D., Professor (*Entomology, Environmental Toxicology*)

Charles L. Judson, Ph.D., Professor

Richard Karban, Ph.D., Associate Professor

Harry K. Kaya, Ph.D., Professor

Lynn S. Kimsey, Ph.D., Associate Professor

Harry H. Laidlaw, Jr., Ph.D., Professor Emeritus

W. Harry Lange, Jr., Ph.D., Professor Emeritus

Thomas F. Leigh, Ph.D., Lecturer

G. A. H. McClelland, Ph.D., Senior Lecturer, S.O.E.

Donald L. McLean, Ph.D., Professor Emeritus

Susumu Maeda, Ph.D., Assistant Professor

Robert E. Page, Ph.D., Associate Professor

Michael P. Parella, Ph.D., Associate Professor

Christine Y. S. Peng, Ph.D., Associate Professor

Timothy Prout, Ph.D., Professor Emeritus

(*Entomology, Genetics*)

Richard E. Rice, Ph.D., Lecturer

Arthur Shapiro, Ph.D., Professor (*Entomology, Zoology*)

Francis M. Summers, Ph.D., Professor Emeritus

Robbin W. Thorp, Ph.D., Professor  
 Philip S. Ward, Ph.D., Associate Professor  
 Robert K. Washino, Ph.D., Professor  
 Lloyd T. Wilson, Ph.D., Professor  
 Frank G. Zalom, Ph.D., Lecturer

## The Major Program

The Entomology major provides students an opportunity for extensive study of insects—their behavior, classification, structure, physiology, and ecology. Some of the areas of emphasis in entomology are: biosystematics, management of pest insects with natural enemies and chemicals, management of honeybees for pollination of agricultural crops and honey production, nematology and transmission of plant and animal pathogens. Employment opportunities are available in managerial and technical positions with state and federal agencies and agricultural production or chemical companies. Some entomology graduates prepare to teach entomology and other biological sciences in high schools. Other graduates matriculate in graduate programs leading to a higher degree.

## B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable and may be critical for the attainment of some career goals. *Courses shown without parentheses are required.*)

<b>Preparatory Subject Matter</b>	<b>70-75</b>
Chemistry (Chemistry 1A, 1B, 8A, 8B).....	16
Mathematics 16A .....	3
Statistics .....	3
Computer science, Mathematics 16B, or additional statistics .....	3
Physics (Physics 1A, 1B) .....	6
Biology (Biological Sciences 1A, 1B, 1C).....	15
Upper-division course in cell or microbiology (Microbiology 102, Botany 114, 119, Plant Pathology 120, Veterinary Microbiology and Immunology 132).....	4-5
Genetics (Genetics 100).....	4
Ecology (Environmental Studies 100 or Zoology 125).....	3-4
Evolution (Genetics 103, Zoology 148).....	3-4
Physiological chemistry (Physiological Sciences 101A-101B or Biochemistry 101A-101B).....	6-7
Upper division electives courses in science (exclusive of entomology), and related to student's interest.....	4-5
<b>Depth Subject Matter</b>	<b>39-42</b>
General entomology, Entomology 100, 100L.....	5
Structure and function, Entomology 101, 102 .....	7
Systematics, Entomology 103.....	3
Ecology, Entomology 104.....	4
Entomology 109, or Entomology 105L-106 or 105-105L.....	4-7
Applied entomology, one course from Entomology 110, 115, 153 .....	4
Upper-division electives courses in entomology.....	12
<b>Breadth Subject Matter</b>	<b>37-43</b>
English (see College requirement).....	4
Rhetoric (see College requirement) .....	4
Economics .....	5
Philosophy .....	4
At least one course from the following categories:	
(a) Anthropology, political science, psychology, or sociology.....	3-5
(b) Art or music.....	4
Electives in social sciences and humanities .....	10-12
At least one course chosen from agrarian studies, geography, or geology.....	3-5
<b>Unrestricted Electives</b>	<b>20-34</b>
<b>Total Units for the Major</b>	<b>180</b>

**Major Adviser.** C.Y.S. Peng.

## Minor Program Requirements:

The Department of Entomology has seven 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.

<b>Entomology</b>	<b>18-19</b>
Entomology 100, 100L .....	5
At least two courses from Entomology 101, 102, 103, 104, 106 .....	7-8
At least two additional upper division Entomology courses (except courses 192, 198, 199) .....	6
	UNITS
<b>Agricultural Entomology</b>	<b>21</b>
Entomology 100, 100L, 110, 115, 135 .....	17
Entomology 120.....	4
	UNITS
<b>Apiculture</b>	<b>18</b>
Entomology 100, 100L, 119, 119L .....	10
Entomology 104 or 110 .....	4
One course from the following: Agronomy 120, Botany 102, Pomology 102.....	4
	UNITS
<b>Insect Ecology</b>	<b>20</b>
Entomology 100, 100L, 104 .....	9
Seven units from Entomology 103, 105, 106, 109 .....	7
Zoology 149 or Environmental Studies 121 .....	4
	UNITS
<b>Medical-Veterinary Entomology</b>	<b>18</b>
Entomology 100, 100L, 104, 153, 156 .....	16
At least two units from Entomology 156, Veterinary Microbiology and Immunology 126, 126L, 128, 132 .....	2

**Minor Adviser.** C.Y.S. Peng.

**Graduate Study.** The Department of Entomology offers a program of study and research leading to the M.S. and Ph.D. degrees. See the Graduate Division Section and the *Graduate Announcement* for further details.

**Graduate Advisers.** See *Class Schedule and Room Directory*.

**Related Courses.** See courses in Nematology.

## Courses in Entomology

### Lower Division Courses

**10. Natural History of Insects** (3) II. Dingle, Kaya  
 Lecture—3 hours. 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. An introduction to the insects detailing their great variety, structures and functions, habits, and their significance in relation to plants and animals including man.

**17. Natural Selection and Sociobiology** (4) I. Karban  
 Lecture—3 hours; discussion—1 hour. Introduction to the theory of natural selection, using evaluations and applications of behavioral adaptations, ranging from insects to humans. General Education credit: Nature and Environment/Introductory.

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
 (P/NP grading only.)

### Upper Division Courses

**100. General Entomology** (3) I. Granett in charge  
 Lecture—3 hours. Prerequisite: Biological Sciences 1A. Biology, anatomy, physiology, development, classification, ecology and relation of insects to human welfare.

**100L. General Entomology Laboratory** (2) I.  
 Granett in charge  
 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.

**101. Functional Insect Morphology** (3) II. Peng  
 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.

**102. Insect Physiology** (4) III. Duffey, Hammock, Judson  
 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.

**103. Insect Systematics** (3) III. Ward

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.

**104. Insect Ecology and Behavior** (4) II. Page

Lecture—3 hours; laboratory—3 hours. Prerequisite: introductory course in ecology (Zoology 125, Environmental Studies 100, Botany 117). Principles of ecology and behavior with emphasis on insects. Mechanisms and evolutionary aspects of behaviors, population dynamics, and community organization are explored. Students are acquainted with scientific method of formulating and testing hypotheses about natural systems.

**105. Insect Classification** (1) II. Thorp, Grigarick, Ward  
 Lecture—1 hour. Prerequisite: course 100. Theories on the phylogenetic history of insects; classification at the level of families, orders, and ordinal groups. Offered in odd-numbered years.

**105L. Insect Classification Laboratory** (2) II.

Thorp, Grigarick, Ward  
 Laboratory—6 hours. Prerequisite: course 100L. Classification and identification of insects with emphasis on family-level taxa. Offered in odd-numbered years.

**106. Field Entomology** (2) III. Thorp

Laboratory—6 hours; two all-day Saturday field trips. Prerequisite: course 100 and 105L. Collection and comparative analyses of insect faunas from selected ecological zones in California. Offered in odd-numbered years.

**109. Field Taxonomy and Ecology** (7) Extra-session summer. Ward

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 even-numbered years.

**110. Economic Entomology** (4) I. Grigarick.

Lecture—2 hours; laboratory—6 hours. Introductory course dealing with the identification, biology, and control of insects and mites that cause economic losses. Emphasis is placed on the management of agricultural pests but includes structural, household, storage, and ornamental pest problems.

**111. Insects and Human Affairs** (4) II, III. McClelland

Lecture—2 hours; discussion—1 hour; film/demonstration—1 hour; one required evening meeting. Prerequisite: Biological Sciences 10 recommended. Diversity, structure and function of insects. Their role as benefactors, competitors, and destroyers of human resources and health. Their contribution to human culture and scientific knowledge. Approaches to insect pest control and its environmental, social and political correlates. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10.

**115. Arthropod Management in Agriculture (4) II.**

Granett, Wilson  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or 110. Principles of integrated pest management with emphasis on arthropod pests in California crop systems. Definition of pest status, measurement of pest damage, and interactions between pests and plants. Integration of control tactics. Use of insecticides within the IPM framework.

**116. Biology of Aquatic Insects (3-5) III.**

Gigarick  
Lecture—2 hours and laboratory (Saturday field trips); optional laboratory on identification and/or aquatic insect collection. Prerequisite: course 100 or consent of instructor. A study of the life history, ecology, and identification of insects associated with streams, ponds, and lakes.

**119. Apiculture (3) II.**

Gary  
Lecture—3 hours; papers. Prerequisite: Biological Sciences 1C recommended. Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey production, pollination activities. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10 or Botany 10.

**119L. Apiculture Laboratory (2) III.**

Gary  
Lecture—1 hour; laboratory—3 hours. Prerequisite: course 119. Biology and behavior of honey bees; fundamentals of culture, management, and use of colonies for agricultural, recreational, teaching, and research purposes.

**120. Insect-Host Plant Interactions (4) II.**

Duffey  
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 101, 102; Biochemistry 101A-101B or the equivalent; general introductory course in botany and/or plant physiology will be helpful. Morphological, physiological, and biochemical bases of host-plant selection by insects; consideration of bases of host-plant resistance to insects. Emphasis on comparative defensive and biochemical interaction between various organisms, particularly plants and insects.

**135. Introduction to Biological Control (4) III.**

Ehler, Kaya  
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 augmentation biological control. Role of biological control in pest management.

**147. Historical Biogeography and Evolution of Biodiversity (3) III.**

Kimsey  
Lecture—3 hours. Prerequisite: Botany 10 or Biological Sciences 10. Designed for non-majors. Explores the relationships between physical changes in the continents and the evolution and diversification of plants and animals, particularly insects, over the past 400 million years.

**153. Medical Entomology (4) I.**

McClelland  
Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in one of the biological sciences or consent of instructor. The worldwide relationships of insects and other arthropods to human health. The biology and basic classification of medically important arthropods with special emphasis on the ecology of arthropod-borne human diseases and principles of their control. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Entomology 111 or any other course in the biological sciences.

**156. Biology of Parasitism (3) III.**

Washino in charge; Theis (Medical Microbiology), Maggenti (Nematology)

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.

**156L. Biology of Parasitism Laboratory (1) III.**

Washino in charge; Theis (Medical Microbiology), Maggenti (Nematology)

Laboratory—3 hours. Prerequisite: course 156 (con-

currently) 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.

**192. Internship (1-12) I, II, III, extra session.**

The Staff (Chairperson in charge)  
Laboratory or fieldwork—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learn experience 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) I, II, III.**

McClelland  
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) I, II, III, summer.**

The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III, summer.**

The Staff (Chairperson in charge)  
(P/NP grading only.)

**Graduate Courses****200A. Conceptual Basis of Entomology: Basic Biology (4) II.**

Duffey, Washino  
Lecture—3 hours; discussion—1 hour. Selected advanced topics in contemporary entomological research with an emphasis on theoretical and fundamental aspects of natural selection, behavior, ecology, physiology, and biochemistry as relates to the regulation of insect populations. Provides the theoretical framework for course 200B.

**200B. Conceptual Basis of Entomology: Application (4) III.**

Washino, Duffey  
Lecture—3 hours; discussion—1 hour. Selected advanced topics in contemporary entomological research with emphasis on the application of theoretical/conceptual outlines from course 200A to epidemiology, biotechnology, biological control and integrated pest management for pursuing current insect pest problems concerning food, fiber, and health.

**202. Advanced Insect Physiology (2) III.**

Judson  
Lecture—2 hours. Prerequisite: course 102 or the equivalent or consent of instructor; Biochemistry 101A or 101B recommended. Selected topics in insect physiology. Intensive study of topics of current interest, which will vary from year to year. Course may be repeated for credit. Offered in odd-numbered years.

**205. Insect Demography (3) III.**

Carey  
Lecture—3 hours. Prerequisite: introductory ecology; calculus. Concepts and methods of mathematical demography as applied to insect populations; reasoning behind demographic calculations. Mechanisms of calculations stressed. (S/U grading only.)

**208. Pesticide Toxicology in Arthropods (3) II.**

Granett, Hammock  
Lecture—2 hours; discussion—1 hour. Prerequisite: course 115 or Environmental Toxicology 101 (may be taken concurrently); Biochemistry 101B. Principles of pesticide toxicology including resistance, selectivity, pharmacodynamics, sites of action and life tables. Emphasis on chemical and field aspects of insecticides and acaricides. Offered in odd-numbered years.

**219. Advanced Apiculture (4) III.**

Peng  
Lecture—2 hours; laboratory—6 hours. Prerequisite: course 119L. Current topics in bee biology with special consideration of morphology, caste determination, queen rearing, nutrition, physiology, pathology, and products of honey bees. Offered in even-numbered years.

**225. Terrestrial Field Ecology (4) III.**

Karban  
Seminar—1 hour; laboratory—12 hours. Prerequisite: introductory ecology and introductory statistics. 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 stressed.

**230. Advanced Biological Control (3) I.**

Ehler  
Lecture—2 hours; discussion—1 hour. Prerequisite: course 135. Advanced treatment of current topics in biological control of arthropod pests and weeds. Offered in odd-numbered years.

**253. Advanced Medical Entomology (3) III.**

McClelland  
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 in odd-numbered years.

**290. Special Topics in Entomology (1-4) I, II, III.**

The Staff (Chairperson in charge)  
Seminar—1-4 hours. Prerequisite: consent of instructor.

**291. Seminar in Medical Entomology (2) I.**

McClelland, Washino, Eldridge  
Seminar—2 hours. Prerequisite: course 153. Discussions of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in man and animals.

**292. Seminar in Insect Physiology (2) I.**

Judson, Duffey, Hammock, Maeda  
Seminar—2 hours. Prerequisite: course 102. Critical examination of areas of current interest to insect physiology and biochemistry.

**293. Seminar in Systematic Entomology (2) III.**

Ward, Thorp, Kimsey  
Seminar—2 hours. Prerequisite: course 103. Selected topics in systematics and evolution are presented and discussed. Some topics may be illustrated by laboratory sessions.

**294. Seminar in Insect Ecology (2) III.**

Carey, Ehler, Karban  
Seminar—2 hours. Prerequisite: a general ecology course. Discussions of advanced topics in ecology with emphasis on analysis of factors influencing the distribution and abundance of insects. Includes consideration of applications of basic theory as in biological control and related approaches.

**295. Seminar in Agricultural Entomology (2) I, II.**

Gigarick, Granett, Leigh, Parrella, Wilson  
Seminar—2 hours. Prerequisite: course 110. Discussion of advanced topics relating to the principles of pest insect population management.

**296. Seminar in Bee Biology (2) I.**

Thorp, Gary, Page, Peng  
Seminar—2 hours. Prerequisite: course 119 or the equivalent. Discussions of behavior, ecology, management, and general biology of bees (Apoidea) with emphasis on the honeybee.

**297. Seminar in Insect Behavior (2) III.**

Gary, Dingle  
Seminar—2 hours. Prerequisite: a course in animal behavior. Review and critical analysis of contemporary advances in insect behavior, especially interpretation and description of observations, physiological mechanisms, functional kinds of behavior, and the application of general principles to the solution of problems in the laboratory and field.

**298. Group Study (1-5) I, II, III.**

The Staff (Chairperson in charge)  
(S/U grading only.)

**299. Research (1-12) I, II, III, summer.**

The Staff (Chairperson in charge)  
(S/U grading only.)

**Professional Courses****403. Oral Presentation of Scientific Information**

(1) I. Granett, Duffey  
Lecture-discussion—2 hours every other week. Prerequisite: graduate standing.† Helps students in preparing information for (1) 8- to 10-minute talks at scientific meetings, (2) research seminars, (3) class lectures, and (4) impromptu talks.

**404. Grantsmanship (2)** III, Granett, Duffey  
Lecture—1 hour; 15-20 page research proposal required. Prerequisite: graduate standing; research experience.† Develops in students an awareness of options and strategies in writing research proposals. Students write a full-length research proposal.

**405. Bioassay Techniques (1)** II, Granett  
Lecture—5 hours (total); laboratory—15 hours (total). Prerequisite: graduate standing; course 115 recommended.† Theory and practice of insect bioassays as they are used in entomology, particularly with insecticides. Offered in odd-numbered years.

**406. Analysis of Natural Products (2)** I, Duffey  
Lecture—1/2 hour; discussion—1/2 hour; laboratory—2 hours. Prerequisite: Biochemistry 101B.† Familiarizes students with basic methods of isolating, identifying, and bioassaying natural products.

**407. Scanning Electron Microscopy (1)** III, The Staff

Lecture—5 hours total; laboratory—6 hours total; individual project. Prerequisite: graduate standing or consent of instructor.† Introduction to basic operation theory of scanning electron microscopes (SEM) in the secondary emissive mode: preparation of samples for examination by SEM; practical application of SEM to produce information emphasizing photographic images of publishable quality. Offered in odd-numbered years.

ecology, physiology, and other biological specialities, as well as quantitative analysis. These courses prepare them for graduate or professional training and, eventually, careers working for public agencies and private firms specializing in environmental quality, natural resources, or ecological research. Students interested in professional schools, e.g., medicine, should consult an adviser early to plan for their special requirements, e.g., organic chemistry. Students in the *Environmental Management* option take courses in recreation, resource economics, planning and public policy, and, especially, quantitative management techniques. The option emphasizes the management of public lands and natural resources in wildland and rural areas. Students are prepared for jobs primarily in public agencies at the federal, state, or local levels. Practical courses in field level planning and management are featured. Students interested in urban problems and/or legislative approaches should examine the *Environmental Policy Analysis and Planning* major.

### B.S. Major Requirements:

(The *usual* courses taken to satisfy requirements are shown in parentheses. Equal or more comprehensive courses may be taken with the adviser's written approval. *Courses shown without parentheses are required.*) Students will be required to plan their course selection with their adviser.

Statistics, Statistics 102 or Agricultural Science and Management 150.....4  
Research methods (Environmental Studies 123, 128, 178, Mathematics 22A, upper division computing, mathematics, or statistics) .....3-5  
(Students may substitute Biological Science 115, 15 units, or Environmental Studies 124, 10 units.)

**Areas of Specialization** .....31-44

#### Environmental Biology Option

Population and community ecology (Environmental Studies 121, Zoology 149, Wildlife and Fisheries Biology 122).....4

Behavioral ecology (Environmental Studies 125) .....4

Evolution (Genetics 103, Geology 107, Zoology 148) .....3-4

Quantitative analysis (Mathematics 22A-22B, upper division mathematics or statistics) .....6-8

Taxonomy, including laboratory experience (Botany 102, 108, 116, Entomology 103, Wildlife and Fisheries Biology 110, 111, 111L, 120, Zoology 112-112L, 133, 133L)† .....4-8

Physiology, including laboratory experience (Environmental Studies 129, 129L)† .....4-7

Biological systems, two courses from one of the following two groups .....6-8

*Aquatic biology:* Environmental Studies 151, 151L, Water Science 122, 122L, Environmental Studies 150B-150C, Wildlife and Fisheries Biology 120, 122.

*Terrestrial ecology:* Wildlife and Fisheries Biology 100, 130, Avian Sciences 100, Botany 101, 102, 117, 141, Geography 173.

#### Environmental Management Option

Recreation, Environmental Biology and Management 127, Environmental Studies 162 .....4

Microeconomics, Economics 100 .....5

Policy evaluation, Environmental Studies 168A .....4

Bureaucratic Policy Making, Environmental Studies 160, 166, or Political Science 182 .....4

Quantitative Resource Management, Agricultural Economics 155, 157, or Environmental Studies 168B .....4

Environmental Management, Environmental Studies 171 or 179 .....3-4

Engineering Planning, Civil Engineering 152, 160, or 175 .....3

Statistical Analysis, Sociology 106, Statistics 108, or Agricultural Economics 106 .....4

Management of a natural resource, two courses from one of the following three groups .....6-8

*Animal Resources:* Range Science 135, or Wildlife and Fisheries Biology 111, 122, 151, or Resource Science 101, or Environmental Studies 123.

*Forest and Rangeland Resources:* Resource Science 2, or Range Science 133, 134, 145

*Air, Water, and Soil Resources:* Resource Science 131, or Water Science 41, 103, 122, 141, or Geography 162, or Soil Science 118, or Environmental Studies 151L.

**Unrestricted Electives** .....20-62

**Total Units for the Degree** .....180

**Major Adviser:** T. M. Powell (*Environmental Studies*).

†Most of these courses require one or two additional chemistry or basic physiology courses as prerequisites. Plan a sequence in consultation with adviser.

## Environmental and Resource Sciences

See **Atmospheric Science; Range and Wildlands Science; Resource Sciences; Soil Science; Water Science; and Wildlife and Fisheries Biology**

## Environmental Biology and Management

(College of Agricultural and Environmental Sciences)

### Faculty

See under the Division of Environmental Studies.

### The Major Program

The Environmental Biology and Management major emphasizes a fundamental program of education in the natural sciences, especially ecology, together with a set of management and public policy analysis courses. 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 in the United States and worldwide. The curriculum draws on a wide variety of scientific disciplines for its theoretical basis and analytical skills. Chemistry, physics, mathematics, biology, and earth sciences are studied and tied together by courses in ecology. Computing, statistics, and other methods courses give the student basic quantitative research skills. Economics, political science, and techniques of quantitative management offerings dominate the management and public policy requirements. The major prepares students to enter careers in management of natural resources and public lands, as well as basic ecological research.

A moderate degree of specialization is permitted in two upper division options. Students in the *Environmental Biology* option take course work in population

**Written/Oral Expression** .....10-12

English (English 1; English 102 concurrently with Environmental Studies 1. Note: English requirement for major simultaneously satisfies College requirement) .....7-8

Oral expression (Rhetoric and Communication 1 or Dramatic Art 10) .....3-4

**Preparatory Subject Matter** .....43-47

Biological sciences (Biological Sciences 1A) .....5

Chemistry (Chemistry 1A-1B or 4A-4B) .....10

Computer Science (Agricultural Science and Management 21, Computer Science Engineering 10, or Engineering 5) .....3

Ecology of biomes (Environmental Studies 30) .....3

Environmental sciences (Biological Sciences 1B or Geology 1-1L) .....4-5

Environmental/policy analysis (Environmental Studies 1, Political Science 1, or Economics 1A; choose Economics 1A if Environmental Management option is selected) .....4-5

Mathematics (Mathematics 16A-16B or 21A-21B) .....6-8

Physics (Physics 5A-5B or 9A-9B) .....8

**Breadth/General Education** .....12-24

Satisfaction of General Education requirement to include 12 units of humanities and/or Civilization and Culture .....12-24

**Depth Subject Matter** .....28-33

(These units must be taken for a letter grade attaining an overall grade-point average of 2.000 or higher.)

Ecology, Environmental Studies 100 .....4

Survey of environmental science, Environmental Studies 110 .....4

Environmental sciences (Soil Science 100, 118, Resource Sciences 131, Atmospheric Science 120, Environmental Studies 150A, Geology 134, 153, 154, Water Science 100, 141) .....6-8

Environmental Policymaking/Resource Economics, Environmental Studies 160, 161, or 165; Agricultural Economics 147, 176; or Economics 123 .....3-4  
(Choose Agricultural Economics if Environmental Management option is selected.)

Management of Public Lands, Environmental Studies 172 .....4

## Minor Program Requirements:

The faculty for Environmental Biology and Management offers a minor in Recreation for students in Landscape Architecture desiring to specialize in recreation area design; Physical Education, Psychology, Sociology, Human Development, and Applied Behavioral Sciences students wishing to work in educational and therapeutic recreation; Environmental Policy Analysis and Planning students seeking careers in public recreation policy analysis and management; Agricultural and Managerial Economics students wishing to go into the administration of commercial recreation enterprises; and those students in Plant Science interested in park landscape construction and maintenance.

### UNITS

#### Recreation ..... 22-23

Leisure behavior, Environmental Biology and Management 116 or 127 ..... 4

(Course 116 is prerequisite to Environmental Biology and Management 122 and 134)

Resource economics, Agricultural Economics 147, 176, Economics 123 ..... 3-4

Urban recreation programs, Physical Education 150 ..... 3

Recreation planning and policy analysis, Environmental Biology and Management 134 or Environmental Studies 162 ..... 4

Recreation administration, Environmental Biology and Management 122 ..... 4

Internship, Environmental Biology and Management 192 ..... 4

**Minor Adviser.** R. A. Johnston (*Environmental Studies*).

## Courses in Environmental Biology and Management

Questions pertaining to the following courses should be directed to the instructor or to the Environmental Biology and Management advising office, 2132 Wickson Hall.

### Lower Division Courses

#### 98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

#### 99. Special Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

### Upper Division Courses

#### 110. Urban and Regional Planning (4) II. Gold (Environmental Horticulture)

Lecture—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: upper division standing. The history, nature, scope, and significance of planning in America with emphasis on basic definitions and concepts, the planning process and comprehensive plan, significant problems and potentials, design alternatives, the future, innovation, and the profession.

#### \*116. Outdoor Recreation (4) I. The Staff

Lecture—3 hours; discussion—1 hour. History, nature, scope, and significance of outdoor recreation in American life, with emphasis on user-resource relationships, special problems, policy issues, and innovation.

#### \*122. Park Administration (4) II. The Staff

Lecture—3 hours; discussion—1 hour; Saturday field trip. Prerequisite: course 116. Description and analysis of the nature, concepts, and techniques of providing leisure opportunities with emphasis on the policies, programs, and organization of park and recreation systems.

#### 127. Leisure Behavior (4) II. Loomis

Lecture—2 hours; discussion—2 hours. Prerequisite: course 116; Applied Behavioral Sciences 170 recommended. Investigation of selected leisure environments and resultant behavior. Analysis of leisure behavior from a motivational base. Historical analysis of different leisure environments cross-culturally.

#### 134. Recreation Planning (4) III. Gold

Lecture—3 hours; discussion—1 hour; one Saturday field trip. Prerequisite: courses 110, 116. Description of basic concepts, principles, techniques and methods used to prepare park, recreation, and open space plans for urban environments.

#### 160A. Environmental Interpretation Principles (3)

##### II. The Staff

Lecture—3 hours. Prerequisite: Rhetoric and Communication 1 or 3 and English 1 or 104 recommended. Application of communication theories and principles to environmental interpretation with emphasis on park and recreation interpretation, museums, historic areas, botanical and zoological gardens. Emphasis on reasoning to interpretive strategies from theory and principles.

#### \*160B. Environmental Interpretation Methods (3)

##### III. The Staff

Lecture—1 hour; laboratory—3 hours; to be arranged—3 hours. Prerequisite: course 160A; English 104 recommended. Interpretation development and operations. Students learn to plan, produce, present, maintain, and evaluate interpretive programs. Includes instruction in the use of selected interpretive media.

#### 192. Internship in Environmental Biology and Management (1-12) I, II, III. The Staff (Department Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: upper division or graduate standing, completion of upper division course work relevant to the internship topic and consent of instructor. Students apply theory and principles learned in classroom instruction to applied problems under supervision of both a faculty adviser and a professional sponsor. Students must consult with a faculty adviser before applying for an internship. (P/NP grading only.)

#### 198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

#### 199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: 3 units of upper division work in park administration; consent of instructor. (P/NP grading only.)

### Graduate Courses

#### 290. Seminar (1-2) I, II, III. The Staff (Chairperson in charge)

Seminar—1-2 hours. An interdisciplinary seminar on selected current topics related to environmental planning, leisure behavior and environmental quality.

#### 299. Research (1-6) I, II, III. The Staff (Chairperson in charge)

Research—3-18 hours. (S/U grading only.)

## Environmental Design

(College of Agricultural and Environmental Sciences)

Victoria Z. Rivers, M.A.C.T., S.C.T., Chairperson of the Department

Department Office, 144 Walker Hall (916-752-6223)

### Faculty

Richard Berteaux, B.Arch., M.S., Associate Professor

Frances Butler, M.A., Professor

Kerry J. Dawson, M.L.A., Associate Professor

Mark Francis, M.L.A., Professor

Dolph Gotelli, M.A., Associate Professor

Patricia Harrison, M.Arch., Assistant Professor

Gyöngy Laky, M.A., Professor

E. Byron McCulley, B.S.L.A., Associate Adjunct

Professor

Edward S. McNeil, M.L.A., Assistant Professor

Helge B. Olsen, Senior Lecturer, S.O.E.;

Susan Palmer, M.A., Lecturer

Victoria Z. Rivers, M.A.C.T., S.C.T., Professor

Katherine W. Rossbach, M.A., Professor Emeritus

Barbara Shawcroft, M.F.A., Professor

JoAnn C. Stabb, M.A., Senior Lecturer, S.O.E.

Robert L. Thayer, Jr., M.A., Professor

**Programs of Study.** See the majors in Design and Landscape Architecture.

**Related Courses.** See Design and Landscape Architecture course lists.

## Environmental Horticulture

(College of Agricultural and Environmental Sciences)

Roy M. Sachs, Ph.D., Chairperson of the Department  
Department Office, 140 Environmental Horticulture  
Building (916-752-0130)

### Faculty

Alison M. Berry, Ph.D., Assistant Professor

David W. Burger, Ph.D., Associate Professor

Thomas G. Byrne, M.S., Lecturer

Don J. Durzan, Ph.D., Professor

Richard Y. Evans, Ph.D., Lecturer

Seymour M. Gold, Ph.D., Professor

James A. Harding, Ph.D., Professor

Richard W. Harris, Ph.D., Professor Emeritus

Charles E. Hess, Ph.D., Professor

Anton M. Kofranek, Ph.D., Professor Emeritus

Harry C. Kohl, Jr., Ph.D., Professor Emeritus

Andrew T. Leiser, Ph.D., Professor Emeritus

J. Heinrich Liebh, Ph.D., Assistant Professor

James D. MacDonald, Ph.D., Associate Professor

(*Plant Pathology*)

John H. Madison, Jr., Ph.D., Professor Emeritus

Carolyn Napolli, Ph.D., Assistant Professor

Jack L. Paul, Ph.D., Professor

Michael S. Reid, Ph.D., Professor

Roy M. Sachs, Ph.D., Professor

Lin L. Wu, Ph.D., Associate Professor

**Related Undergraduate Programs and Graduate Study.** See the undergraduate majors in Environmental Biology and Management, and Plant Science; and for graduate study, refer to the Graduate Division section.

**Related Courses.** See Plant Science.

## Courses in Environmental Horticulture

### Lower Division Courses

#### 6. Introduction to Environmental Plants (3) III, summer. Harding.

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Classification, nomenclature, and identification of common trees, shrubs, ground covers, turfgrasses, bedding plants, and house plants. Characteristics of important plant families are discussed.

#### 10. Landscape Horticulture for the Home and Community (3) III. Burger

Lecture—2 hours; discussion—1 hour. Recommended for non-majors. Influences of climate, soil, and cultural practices on the growing of turf, flowers, and herbaceous and woody plants in the landscape.

#### 92. Internship (1-12) I, II, III. The Staff (Department Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: lower division standing, Biological Sciences 1C or Plant Science 2 or 10, and consent of instructor. Work-learn experience off and on campus in flower and nursery crop production, and marketing; landscape horticulture; and park management. Internships supervised by a member of the faculty. (P/NP grading only.)

#### 99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Sachs in charge)

(P/NP grading only.)

**Upper Division Courses****105. Taxonomy and Ecology of Environmental Plants (4) I.**

Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 6 or one course in taxonomy. Taxonomy of the important plants used in the western landscape. Emphasis will be placed on the identification, nomenclature, characteristics, and uses of woody plants in man's environment.

**107. Herbaceous Environmental Plants (4) III.**

Harding

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: introductory course in environmental plants (course 6) or in plant taxonomy (Botany 108). Evolutionary relationships, hybridization, selection and cultural uses of herbaceous, environmental plant materials with emphasis on family characteristics and genetic and environmental differences. Plants are identified with the use of taxonomic keys.

**120. Management of Container Soils (3) I. Paul**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Soil Science 100. Appropriate use of sand, mineral soil, and amendments to formulate container soils. Management of container soils emphasizing irrigation, salinity control, and fertilizer practices.

**125. Greenhouse and Nursery Crop Production (5) II. Napoli**

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Plant Science 2. Principles and techniques necessary for the greenhouse and nursery production of ornamental crops.

**130. Turfgrass Culture (3) III. Wu**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 2 or Biological Sciences 1C and Soil Science 100. Professional turfgrass culture and management emphasizing turf species and cultivars, physiological differences between turfgrass species, the interaction between turfgrass and the environment, and management practices.

**133. Arboriculture (4) II. Berry**

Laboratory—3 hours; discussion-testing—4 hours. Prerequisite: Plant Science 2 or Biological Sciences 1C. Principles and practices of selecting, planting and maintaining trees, shrubs, and vines in urban and natural landscapes. Course given in individualized instruction format. Students should enroll when juniors if they wish to assist with the course next year.

**192. Internship (1-12) I, II, III. The Staff (Department Chairperson in charge)**

Laboratory—3-36 hours. Prerequisite: completion of 84 units, two upper-division courses in Environmental Horticulture appropriate for the internship, and consent of instructor. Work-learn experience off and on campus in flower production and marketing, nursery crop production and marketing; landscape horticulture; and park management. Internships supervised by a member of the faculty. (P/NP grading only.)

**197T. Tutoring in Environmental Horticulture (1-4) I, II, III. The Staff**

Hours and duties will vary depending on course tutored. Prerequisite: upper division standing, completed course or the equivalent being tutored, and consent of instructor. Leading discussion sections, conducting laboratory exercises or proctoring in individualized instruction format classes under faculty guidance. Weekly conferences on subject matter and instructional techniques. May be repeated once for credit if different course is tutored.

**198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. (P/NP grading only.)

**Graduate Courses****220. Tree Biotechnology (2) II. Durzan**

Lecture—2 hours. Prerequisite: Bachelors or Masters degree in a plant science discipline (botany, plant

physiology, genetics, horticulture, related fields). Develop understanding of basic principles of biotechnology of woody perennials. Cell and tissue culture methods and current process control problems are emphasized. Recombinant DNA methods covered where appropriate. Develop analytical evaluation skills. Review trends in commercialization.

**226. Tissue Culture of Horticultural Crops (2) II.**

Burger

Lecture—1 hour; laboratory—3 hours. Prerequisite: a B.S. degree (or the equivalent) in Plant Science or consent of instructor. In-depth analysis of tissue culture techniques used in horticulture for basic cellular physiology and biochemistry, propagation and breeding. Offered in even-numbered years.

**241. Analysis of Horticultural Problems (3) III.**

Paul Lecture—1 hour; laboratory—6 hours. Prerequisite: a B.S. degree (or the equivalent) in Plant Science or consent of instructor. Diagnosis of ornamental plant disorders. Emphasis on distinguishing among disorders caused by soil, water, insects, pathogens, chemical agents, climatic conditions and cultural practices using visual symptoms and circumstances for determining probable cause and laboratory methods for confirmation. Offered in odd-numbered years.

**290. Seminar (1) I, II, III. The Staff (Chairperson in charge)**

Seminar—1 hour Research conference conducted by departmental faculty to discuss design, philosophy, and interpretation of ongoing specific research areas which include plant morphogenesis, floriculture, greenhouse production and modeling, landscape plant ecology, arboriculture, turf culture, post harvest, plant breeding, etc. (S/U grading only.)

**290C. Research Group Conference (1) I, II, III.**

Lieth, Napoli, Reid, Sachs, Wu

Discussion—1 hour. Prerequisite: students in a plant science graduate program. Research conference conducted by departmental faculty to discuss design, philosophy, and interpretation of ongoing specific research areas which includes plant morphogenesis, floriculture, greenhouse production, landscape plant ecology, arboriculture, turf culture, post harvest, and plant breeding related to environmental horticulture. (S/U grading only.)

**297T. Tutoring in Environmental Horticulture (1-4) I, II, III. The Staff (Chairperson in charge)**

Tutoring—4 to 8 hours; discussion—1 hour. Prerequisite: graduate student standing; completion of course to be tutored (or the equivalent) and/or consent of instructor. Leading discussion sessions, conducting laboratory exercises, and lecturing in Environmental Horticulture classes under faculty guidance. Weekly conference on subject matter and instructional techniques. May be repeated for credit by tutoring in different courses.

**298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)****299. Research (1-12) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: graduate standing. (S/U grading only.)

## Environmental Policy Analysis and Planning

(College of Agricultural and Environmental Sciences)

**The Major Program**

Environmental Policy Analysis and Planning seeks to develop an understanding of both techniques for evaluating, and the factors affecting, governmental policy-making in a variety of fields related to environmental quality. This major is designed to provide students with a general background in the natural sciences relevant to environmental policy. It also provides sufficient training in mathematics, statistics, and research methodology to quantitatively analyze environmental problems and policy options. A strong background in policy analysis, including the evaluation of policy alternatives and the study of factors affecting policy formulation and implementation is included. In addition, students are encouraged to develop substantive knowledge in a specific field of environmental policy, such as urban and regional planning, water pollution control, or energy development.

The major will be attractive to students who want the analytical skills and broad background in the social and natural sciences for employment in public agencies, consulting firms, and businesses concerned with environmental affairs. It will also be appealing to preprofessional students who want to go on to graduate work in law, planning, public policy, or management, and who need both a wide background in the social and natural sciences and a fairly extensive background in a policy area. It is anticipated, however, that most career-oriented graduates will eventually seek an advanced degree.

The course requirements are designed to provide both the basic substantive knowledge and analytical skills necessary for a quality program in environmental policy analysis and planning. Although certain courses are stipulated for all students involved in the program, the emphasis is on required units within categories of courses. This recognizes the wide variety of students' interests and the changing content and quality of specific courses from year to year. It is very important, however, that students develop a close relationship with their own adviser in order that the preparatory and depth courses selected be appropriate to each student's interests and desired area of specialization.

**B.S. Major Requirements:**

(Courses in parentheses are those normally taken. Very similar or more difficult courses may be taken with the approval of your adviser. Courses shown without parentheses are required.)

**UNITS**

<b>Written/Oral Expression</b> .....	<b>10-11</b>
See College requirement .....	7-8
Additional English (English 102 concurrently with Environmental Studies 1) .....	3
<b>Preparatory Subject Matter</b> .....	<b>51-58</b>
Biological sciences (Biological Sciences 1A) .....	5
Chemistry (Chemistry 1A, 1B) .....	10
Computer science (Agricultural Science and Management 21, Engineering 5, Computer Science Engineering 10, 30) .....	3-4
Economic principles (Economics 1A, 1B) .....	10
Environmental science/agriculture (Animal Science 1, Biological Sciences 1B, Geography 1, Geology 1, Plant Science 10, Soil Science 100, Water Science 100, 104) .....	3-5
Environmental studies (Environmental Studies 1) .....	4

## Environmental Planning and Management

### See Environmental Biology and Management

Mathematics (Mathematics 16A-16B or 21A-21B) .....	6-8
Physics (Physics 1A) .....	3
Political science (Political Science 1) .....	4
Statistics (Statistics 13, 32) .....	3-4
<b>Breadth/General Education .....</b>	<b>6-24</b>
Satisfaction of General Education requirement .....	6-24
<b>Depth Subject Matter .....</b>	<b>37-40</b>
(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.)	
<b>Core Courses</b>	
Environmental Studies 160. ....	4
Environmental Studies 161, 173, or Water Science 150 .....	3-4
Environmental Studies 166. ....	4
Environmental Studies 168A. ....	4
Environmental Studies 171 or 179 .....	3-4
Environmental Studies 110. ....	4
Environmental Studies 164. ....	4
<b>Research Methods</b>	
Environmental Studies 177, or 178; or Sociology 103.....	4
Sociology 106 or Agricultural Economics 106 or Statistics 108 .....	3-4
<b>Economic Analysis</b>	
Economics 100.....	5
Agricultural Economics 176 .....	3
<b>Areas of Specialization (choose one) .....</b>	<b>17-23</b>
<b>Advanced Policy Analysis Option</b>	
Political institutions (Political Science 102, 105, 108, 155, Environmental Studies 162) .....	4
Political behavior (Political Science 164, 165, 170) .....	4
Science policy (Environmental Studies 165) .....	4
Policy evaluation research (Environmental Studies 168B) .....	4
Policy evaluation (Civil Engineering 153, 160, Agricultural Economics 155, Economics 125, 130) .....	3-4
<b>City and Regional Planning Option</b>	
Urban design (Art 168, Environmental Biology and Management 110; Landscape Architecture 40 recommended) .....	3-4
Urban geography (Geography 155, 156) .....	4
Transportation planning (Civil Engineering 160) .....	3
Environmental impact assessment (Soil Science 118, Environmental Studies 179) .....	3-4
Urban economics (Economics 125) .....	4
Urban politics (Political Science 102, 100) .....	4
(Enroll for Environmental Studies 173 for law requirement under Depth Subject Matter above.)	
<b>Energy Policy Option</b>	
Environmental health (Environmental Studies 126, Environmental Toxicology 101) .....	4
Nuclear hazards (Environmental Studies 115) .....	3
Energy technology (Engineering 160, 162) .....	4
Solar energy (Resource Sciences 103) .....	3
Economics of energy (Environmental Studies 169) .....	4
Energy policy (Environmental Studies 167) .....	4
<b>Environmental Science Option</b>	
Environmental health (Environmental Studies 126, Environmental Toxicology 101) .....	4
Soils and land use (Soil Science 118, Geology 134) .....	3-4
Aquatic systems (Environmental Studies 116, 151, Water Science 41, 103, 141, 180) .....	3-4
Meteorology and air pollution (Resource Sciences 131, Atmospheric Science 149A, 158, Civil Engineering 149) .....	3-4

Science policy (Environmental Studies 165) .....	4
<b>Recreation Policy Option</b>	
Leisure behavior (Environmental Biology and Management 127) .....	4
Survey research (Environmental Studies 177) .....	4
Urban recreation (Physical Education 150, Environmental Biology and Management 134) .....	4
Recreation policy analysis (Environmental Studies 162) .....	4
Recreation management (Environmental Biology and Management 122 Agricultural Economics 112) .....	4
<b>Transportation Planning Option</b>	
Urban structure (Geography 155, 156 Economics 125) .....	4
Transportation planning (Civil Engineering 160) .....	3
Transportation engineering and analysis (Civil Engineering 161, Environmental Studies 168B) .....	3-4
Energy policy (Environmental Studies 167, Engineering 160) .....	4
Air quality (Resource Sciences 131) .....	3
Energy and environmental aspects of transportation (Environmental Studies 163) .....	3
<b>Water Quality Option</b>	
Water resource management (Environmental Studies 126, Environmental Toxicology 101, Geography 162) .....	4
Water pollution (Water Science 41, Soil Science 120) .....	2-3
Freshwater systems (Water Science 122, Environmental Studies 151) .....	3-4
Field and laboratory methods (Water Science 122L, Environmental Studies 151L) .....	2-3
Water chemistry (Water Science 103, 180) .....	3-4
Hydrology (Water Science 141) .....	3
(Enroll for Water Science 150 for law requirement under Depth Subject Matter above.)	
<b>Unrestricted Electives .....</b>	<b>24-59</b>
<b>Total Units for the Degree .....</b>	<b>180</b>
<b>Major Adviser.</b> S. I. Schwartz (Environmental Studies)	
<b>Minor Program Requirements</b>	
The faculty for environmental policy analysis and planning offers the following two minors. The Energy Policy minor is for students from any major seeking basic training in energy technology, impacts and policy analysis methods applied to energy systems. The second minor is intended for natural and social science students desiring basic training in policy analysis theory and methods	
UNITS	
<b>Energy Policy .....</b>	<b>18-19</b>
Preparation: Economics 1A; basic course in political science	
Resource Sciences 3 or Engineering 160 .....	3-4
Environmental Studies 126 or Environmental Toxicology 101 .....	4
Resource Sciences 103 or Environmental Studies 115 .....	3
Environmental Studies 169 .....	4
Environmental Studies 167 or Political Science 171 .....	4
UNITS	
<b>Environmental Policy Analysis .....</b>	<b>23-24</b>
Preparation: Economics 1A; basic course in political science.	
Environmental Studies 110, 160, 161, 166, 168A .....	20
Environmental Studies 171 or 179 .....	3-4
<b>Minor Adviser.</b> S. I. Schwartz (Environmental Studies)	

## Environmental Studies

(Intercollege Division)

Charles R. Goldman, Ph.D. Chairperson of the Division  
Division Office, 2132 Wickson Hall (916-752-3026)

### Faculty

Theodore C. Foin Jr. Ph.D. Professor  
Charles R. Goldman, Ph.D., Professor  
William J. Hamilton III, Ph.D., Professor  
Alan M. Hastings, Ph.D., Professor  
Robert A. Johnston, M.S., Associate Professor  
John B. Loomis, Ph.D., Associate Professor  
(Environmental Studies, Agricultural Economics)  
Benjamin S. Orlove, Ph.D., Professor  
Mark R. Patterson, Ph.D., Assistant Professor  
Thomas M. Powell, Ph.D., Professor  
James F. Quinn, Ph.D., Associate Professor  
Peter J. Richerson, Ph.D. Professor  
Paul A. Sabatier Ph.D., Professor  
Thomas W. Schoener, Ph.D., Professor (Zoology)  
Christine Schonewald-Cox, Ph.D., Assistant Adjunct Professor  
Seymour I. Schwartz, Ph.D., Professor  
Daniel Sperling, Ph.D., Associate Professor (Environmental Studies, Civil Engineering)  
Geoffrey A. Wandersforde-Smith, Ph.D., Associate Professor (Environmental Studies, Political Science)  
James E. Wiles, Ph.D., Professor (Environmental Studies, Agricultural Economics)

### The Program of Study

The intercollege Division of Environmental Studies is a teaching and research unit offering courses, workshops, and directed group study classes that focus on the complex problems of human-environment relations. The Division offers Bachelor of Science degrees in Environmental Biology and Management and in Environmental Policy Analysis and Planning. Courses in Environmental Studies also supplement major programs in a wide variety of established disciplines, although highly motivated undergraduates who find existing majors unsuited to their educational objectives are encouraged to contact the Chairperson and faculty of the Division regarding individual majors in the College of Agricultural and Environmental Sciences (see Individual Major in the Programs and Courses section).

**Current Information.** Through its continuing contracts with many other departments and teaching divisions on the campus, the Division develops each year a variety of special courses and workshops that cannot be listed here. Students are advised to check with the Division Office and with the expanded course description handbook of the College of Agricultural and Environmental Sciences for up-to-date information about courses.

**Graduate Study.** The faculty of the Division offers graduate instruction through the M.S. and Ph.D. degree programs of the Graduate Group in Ecology, as well as through the graduate programs of the disciplines with which they are associated, such as agricultural economics, zoology, sociology, political science, civil engineering, and anthropology. Further information about graduate programs in ecology should be obtained from the Chairperson of the Graduate Group in Ecology.

**Graduate Adviser.** T.C. Foin (Ecology).

### Courses in Environmental Studies

#### Lower Division Courses

**1. Environmental Analysis (4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: English 1; English 102, Economics 1A, 1B, Biological**

Sciences 1A, and Political Science 1 recommended. Analysis of the biological, physical, and social interactions which constitute environmental problems, such as food production, energy development and conservation, pollution, and the conservation of natural environments. Emphasis on analysis of problems and the consequences of proposed solutions.

#### 10. Introduction to Environmental Studies (4) I.

The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology recommended. Survey of the importance of ecology and systems behavior for man-environment relationships and management problems. Resources, environmental quality, urban dynamics, environmental perception, and conservation are covered. Includes several integrative case studies, and features individual reading in environmental problems. Not open for credit to those who have had course 1. General Education credit: Contemporary Societies/Introductory.

#### 30. The Global Ecosystem (3) III. Richerson

Lecture—3 hours. Prerequisite: Biological Sciences 1A or Geography 1 or consent of instructor. Focuses upon how the interaction of climate and biotic adaptation produces ecological systems. It will then examine the limits and opportunities for human use of different natural environments, as well as more general questions of human utilization for the earth's biotic resources. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10.

#### 92. Internship (1-12) I, II, III. The Staff (Department Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work-learn 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) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

### Upper Division Courses

#### 100. General Ecology (4) I. Quinn

Lecture—3 hours; discussion—1 hour. Prerequisite: elementary biology (including botanical and zoological elements); elementary calculus. Ecological principles of biological systems, emphasizing populations and ecosystems. Principles of growth, regulation, distribution, structure, energetics, and mineral cycles related to the evolution of biological systems and applications to selected human ecological problems.

#### 101. Human Ecology (4) I. Richerson

Lecture—3 hours; discussion—1 hour. Prerequisite: one course from course 30, Anthropology 1, 2, Genetics 10, or the equivalent. Critical variables in the processes that relate humans and their environment. Emphasis on the biological, cultural, social, and psychological forces which encourage stability or change in human ecological relationships. (Same course as Anthropology 101.) General Education credit: Contemporary Societies/ Non-Introductory. Recommended GE preparation: Environmental Studies 1, 30, Anthropology 1, 2, Biological Sciences 10, Geography 2, or Sociology 2.

#### (a) Environmental Science

#### 110. Principles of Environmental Science (4) I. Powell

Lecture—3 hours; discussion—1 hour. Prerequisite: Physics 1A or 5A, 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.

#### 115. Bioenvironmental Consequences of Nuclear Technology (3) III. M. Goldman

Lecture—3 hours; field trip to nuclear power station. Prerequisite: a course in biology. Biospheric implications of radio-nuclides and thermal effluents generated

by nuclear technology. Hazards evaluation based on predictions of the most sensitive physiological response. Offered in odd-numbered years. (Same course as Radiological Sciences 115.)

#### 116. The Oceans (3) II. Powell

Lecture—3 hours. Introductory survey of the marine environment; oceanic physical phenomena, chemical constituents, geological history, the sea's biota, and utilization of marine resources. (Same course as Geology 116.) General Education credit with concurrent enrollment in course 116G: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10, Chemistry 10, or Geology 1.

#### 116G. The Oceans: Discussion (2) II. Powell

Discussion—2 hours. Prerequisite: course 116/Geology 116 concurrently. Scientific method applied to the discovery of the processes, biota, and history of the oceans. Group discussion and preparation of papers on related topics. (Same course as Geology 116G.) General Education credit with concurrent enrollment in course 116; Nature and Environment/Non-Introductory. Recommended GE preparation: see course 116 above.

#### (b) Ecological Analysis

#### 121. Population Ecology (4) II. Hastings

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1B, 1C, Mathematics 16A-16B. 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. Offered in odd-numbered years.

#### 123. Introduction to Field and Laboratory Methods in Ecology (4) III. Hamilton

Lecture—2 hours; laboratory—6 hours; two weekend field trips. Prerequisite: Statistics 13, course 100 (may be taken concurrently), or the equivalent. Course will introduce students to methods used for collecting ecological data in field and laboratory situations. Methods used by population ecologists and community ecologists are included and emphasis will be placed on experimental design, scientific writing, and data analysis.

#### 124. Marine and Coastal Field Ecology (10) Extra-session summer. Chow

Lecture—6 hours; discussion—4 hours; seminar—1 hour; laboratory—18 hours (Summer Session II). Prerequisite: Biological Sciences 1A; Statistics 13; course 100. Full-time study at Bodega Marine Laboratory. Intensive lecture-laboratory-field study of current ecological theory and problems with emphasis on marine populations and communities; techniques and evaluation of quantitative field research.

#### 125. Social Systems of Animals and Humans (4) III. Hamilton

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or the equivalent recommended. The nature and interpretation of animal social systems, and their relevance to an understanding of man's social conventions and evolution. Aggression, dominance, communication, sexual behavior, cooperation, and social regulation of density are considered from an evolutionary perspective.

#### 126. Environmental and Occupational Epidemiology (4) III. Beaumont

Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in statistics and upper division standing. Methods and contemporary issues in environmental and occupational epidemiology. Effects of carcinogens, reproductive hazards, lifestyle factors, air and water pollution, infectious agents, and other hazards on human populations. Discussion of epidemiologic study designs, biases, and risk assessment.

#### \*127. Contemporary Problems in Environmental Health (3) III. The Staff

Lecture—2 hours; discussion—1 hour. Prerequisite: course 126 or consent of instructor. Contemporary problems and issues in environmentally dependent

aspects of health. Diseases and injuries from environmental carcinogens, teratogens, pesticides, noise, radiation, consumer products, stress phenomena, and heavy metals are considered.

#### 128. Analysis and Simulation of Complex Systems (3) I. Foin

Lecture—3 hours. Prerequisite: Mathematics 16B or 21B; Statistics 102; upper division standing in the biological or social sciences. Analysis of systems and construction of simulation models of ecological and socioeconomic systems using DYNAMO; evaluation of models. Logical and scientific reasoning is stressed.

#### 128L. Laboratory in Modeling Complex Systems (2) I. Foin

Laboratory—6 hours. Prerequisite: course 128 concurrently. Laboratory in model building. Students use material from course 128 to complete a number of exercises and small term projects. Simulation is in DYNAMO.

#### 129. Physiological Ecology (4) I. Patterson

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 1B, Physics 1B, and Biological Sciences 1B or 1C. Comparative and evolutionary study of organismic responses and adaptations to the physical and chemical environment. Body size and metabolism, gas and nutrient exchange, thermoregulation, biomechanics, locomotion, and selected topics in current research.

#### 129L. Physiological Ecology Laboratory (3) I. Patterson

Laboratory—6 hours. Prerequisite: course 129 (may be taken concurrently) or the equivalent. Methods for monitoring physical variables in aquatic and terrestrial environments and animal responses to them. Water balance, respiration, and thermoregulation are demonstrated and a broadly comparative approach is considered. Enrollment limited.

#### (c) Cultural Ecology

#### 133. Cultural Ecology (4) III. Orlove

Lecture—3 hours; discussion—1 hour. Comparative survey of the interaction between diverse human cultural systems and the environment. Primary emphasis given to people in rural and relatively undeveloped environments as a basis for interpreting more complex environments. (Same course as Anthropology 133.) General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2.

#### (d) Aquatic Ecosystems Analysis

#### 150A. Physical and Chemical Oceanography (4) III. Powell

Lecture—3 hours; discussion—1 hour. Prerequisite: Environmental Studies/Geology 116, Physics 9B, Mathematics 22C, Chemistry 1C; or upper division standing in a natural science and consent of instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geo-chemical cycles. Offered in odd-numbered years. (Same course as Geology 150A.) Offered in odd-numbered years.

#### 150B. Geological Oceanography (3) II. McClain (Geology)

Lecture—3 hours. Prerequisite: Geology 50 or 116. 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.)

#### 150C. Biological Oceanography (3) III. Powell

Lecture—3 hours. Prerequisite: Biological Sciences 1A and a course in general ecology, or consent of instructor. Survey of the ecology of major marine habitats including intertidal, shelf benthic, deep-sea and plankton communities. Existing knowledge and contemporary issues in research. Portion of course will be devoted to man's use of and impact on the ocean. Offered in even-numbered years. (Same course as Geology 150C.)

**151. Limnology (4) III. C. Goldman**

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.

**151L. Limnology Laboratory (3) III. C. Goldman**

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.

**(e) Environmental Policy Analysis****160. Environmental Decision Making (4) I. Sabatier**

Lecture—3 hours; discussion—1 hour. Prerequisite:

Political Science 1; Economics 1A; introductory statistics; one course in environmental science.

Alternative models of environmental policy-making, and application to case studies of decision-making in the U.S. and California.

**161. Environmental Law (4) II. Wandesforde-Smith**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing and one course in environmental science (course 1, 10, 110, Biological Sciences 1A, Environmental Toxicology 10, or Resource Sciences 100); English 1 and Political Science 1 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. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 1.

**162. Recreation Policy Analysis (4) III. Loomis**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; Agricultural Economics 147 or 176; Environmental Biology and Management 127. Introduction to major issues and evaluative techniques in the analysis of outdoor recreation policy. Principles of political science and economics are applied to the analysis of recreation demand and provision, and the resolution of conflicts between recreation and other uses.

**163. Energy and Environmental Aspects of Transportation (3) III. Sperling**

Lecture—3 hours. Prerequisite: Civil Engineering 160. Application of engineering, economic, and system planning concepts. Analysis of energy, air quality, and other selected environmental attributes of transportation technologies. Investigation of strategies for reducing pollution and petroleum consumption in light of institutional and political constraints. Offered in even-numbered years. (Same course as Civil Engineering 163.)

**164. Ethical Issues in Environmental Policy (3) III. Sabatier**

Lecture—2 hours; discussion—1 hour. Prerequisite: courses 160, 168A recommended. Basic modes of ethical reasoning and criteria of distributive justice applied to selected topics in environmental policy-making.

**165. Science, Experts and Public Policy (4) II. Craig**

Lecture—4 hours. Prerequisite: upper division standing in the social or biological sciences; course 160 or Political Science 108 recommended. Analysis of factors affecting the influence of scientists, planners, and other experts in policy-making. Several cases and controversies will be examined. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 1.

**166. Policy-Making In Natural Resource Agencies (4) II. Sabatier**

Lecture—3 hours; discussion—1 hour. Prerequisite: Political Science 1 or course 160. Analysis of factors affecting decision-making within administrative agencies responsible for managing natural resources, such as the Forest Service and EPA. Emphasizes critical examination of written materials. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 1.

**167. Energy Policy (4) III. Johnston**

Lecture—4 hours. Prerequisite: Resource Sciences 3 or Engineering 160; course 160 or Political Science 101, 107, or 109. Overview of U.S. energy policy; policy analysis, philosophy and methods; major policy issues, such as renewable vs. nonrenewable; and applied studies of power plants, solar residential, and state policy options. Offered in odd-numbered years.

**168A. Methods of Environmental Policy Evaluation (4) II. Schwartz**

Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 13; Economics 100 (may be taken concurrently); Mathematics 16B or 21B and course 1 recommended. Evaluation of alternatives for solution of complex environmental problems; impact analysis, benefit-cost analysis, distributional analysis, decision making under uncertainty, and multiobjective evaluation.

**168B. Methods of Environmental Policy Analysis (4) III. Schwartz**

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.

**169. The Economics of Energy (4) II. Wilen**

Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural Economics 100B or the equivalent; introductory course in calculus recommended. Economic concepts necessary to study energy issues. Topics covered include: petroleum economics, cartel behavior, exploration and development, economics of alternative energy sources, risk and uncertainty, transition to alternative sources, substitutability. Offered in even-numbered years. (Same course as Agricultural Economics 169.)

**(f) Environmental Planning****171. Environmental Planning (4) I. Johnston**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; a course in social science and a course in environmental science. Laws, institutions, design and analysis methods, and means of implementation of plans for land use, air and water quality, transportation, and energy are examined. Theoretical and practical readings are used. Political and technical problems common to all planning processes emphasized.

**172. Public Lands Management (4) I. Loomis**

Lecture—3 hours; discussion—1 hour. Prerequisite: Economics 1A. 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.

**173. Public Mechanisms for Controlling Land Use (4) I. Johnston**

Lecture—4 hours. Prerequisite: course 1, English 1, Political Science 1, and Economics 1A. Politics and administration of zoning, subdivision and building regulation and open space preservation, constitutional and legal bases for controls; community and political factors influencing legislation and administration of controls; and the relative effectiveness of specific controls in channeling urban growth. Offered in odd-numbered years.

**\*177. Survey Research Methods (4) I. Loomis**

Lecture—3 hours; discussion—1 hour. Prerequisite: Statistics 102, 103, or Sociology 46B. Survey design, administration, response coding, and data analysis. Emphasis on survey design and on uses in recreation policy analysis.

**178. Applied Research Methods (4) I. Sperling, Loomis**

Lecture—4 hours. Prerequisite: Statistics 103 or Sociology 106. 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.

**179. Environmental Impact Reporting (3) III. Johnston**

Lecture—2 hours; discussion—1 hour. Prerequisite: upper division standing; Biological Sciences 1A; one course from the following: course 1, 10, 110, Environmental Toxicology 10, or Resource Sciences 100. Methods of analysis used in environmental impact reporting. Emphasis on effective writing, review and management of impact reports in the context of rational democratic planning systems.

**(g) Other Courses****190. Workshops on Environmental Problems (1-8) I, II, III. The Staff**

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.)

**192. Internship (1-12) I, II, III. The Staff (Department Chair person in charge)**

Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learn 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.)

**198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses****212A. Environmental Policy Analysis (4) III. Sabatier**

Lecture—3 hours; discussion—1 hour; seminar paper. Prerequisite: course in public policy (e.g. Political Science 107 or 108), course in bureaucratic policy making (e.g. course 166 or Political Science 181) and course in intermediate statistics (e.g. Sociology 106 or Agricultural Economics 106). An examination of selected topics in the formulation and implementation of environmental policy, with a principal emphasis on conceptual and methodological issues. Offered in odd-numbered years. (Same course as Ecology 212A.)

**212B. Environmental Policy Analysis: Evaluation (4) I. Schwartz**

Lecture—1 hour; discussion—1 hour; seminar—2 hours; independent evaluation project. Prerequisite: Economics 100 (or the equivalent), course 168A (or the equivalent course in policy analysis or resource economics), intermediate level statistics (e.g. Sociology 106 or Agricultural Economics 106). Examination of recent research and practice in the evaluation of environmentally related policies, programs, and plans. Ex ante and ex post evaluation will be studied. Offered in odd-numbered years. (Same course as Ecology 212B.)

**213. Alternative Transportation Energy (3) II. Sperling**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 163; course 167 or Agricultural Engineering 216 or the equivalent. Economics, environmental impacts, technologies and politics of non-petroleum transportation energy. Experiences in U.S., Brazil, New Zealand, and elsewhere. Energy options include alcohols, natural gas, hydrogen, battery vehicles, electrified roadways, and fuel cells. Offered in even-numbered years.

**\*228. Advanced Simulation Modeling (3) III. Foin**

Lecture—2 hours; discussion—1 hour. Prerequisite: courses 128-128L; Statistics 108 or Agricultural Economics 106. Advanced techniques in simulation modeling; optimization and simulation, dynamic parameter estimation, linear models, error prop-

agation, and sensitivity testing. Latter half of course will introduce model evaluation in ecological and social system models.

**\*228L. Modeling Laboratory (3) III. Foin**  
Laboratory—2 hours; modeling and computing—7 hours. Prerequisite: courses 128-128L; course 228 concurrently. Continuation of course 128L. Students expected to complete series of exercises on advanced topics in modeling and a term project based on their graduate research.

**298. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

**299. Research (1-12) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: graduate standing. (S/U grading only.)

## Environmental Toxicology

(College of Agricultural and Environmental Sciences)

Takayuki Shibamoto, Ph.D., Chairperson of the Department

Department Office, 4138 Meyer Hall (916-752-1142)

### Faculty

Richard G. Burau, Ph.D., Professor (*Environmental Toxicology, Soil Science*)

Donald G. Crosby, Ph.D., Professor

Bruce D. Hammock, Ph.D., Professor (*Environmental Toxicology, Entomology*)

1 Dennis P. H. Hsieh, Sc.D., Professor

Theodore L. Hullar, Ph.D., Professor

Wendell W. Kilgore, Ph.D., Professor

Marion G. Miller, Ph.D., Assistant Professor

Ming-yu Li, Ph.D., Lecturer

Fumio Matsumura, Ph.D., Professor

Robert H. Rice, Ph.D., Associate Professor

James N. Seiber, Ph.D., Professor

Takayuki Shibamoto, Ph.D., Professor

Berry W. Wilson, Ph.D., Professor (*Environmental Toxicology, Avian Sciences*)

Wray W. Winterlin, M.S., Lecturer

Dorothy E. Woolley, Ph.D., Professor (*Environmental Toxicology, Animal Physiology*)

### The Major Program

Environmental Toxicology deals with the properties, fate, biological effects, detection, and regulation of natural and man-made toxicants present in the environment. Toxicants studied in the major include pesticides, pollutants, industrial chemicals, and poisons produced by microbes, plants, and animals. The objective of the major is to provide training which will enable students to apply the principles and methodology of the physical and biological sciences to the study of toxicants as a basis for solving problems occasioned by the presence of toxicants in the environment. Through the appropriate choice of electives, students have the opportunity to specialize in any one of several areas of environmental toxicology. Students electing to emphasize the application of the physical sciences to the study of toxicants would qualify for positions in chemical analysis, environmental monitoring, and forensic toxicology. Those electing to emphasize the application of the biological sciences would qualify for positions in animal toxicology, environmental health and safety, and pest control. The major can also serve as preparation for graduate or professional school.

### B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses where possible; equivalent or more comprehensive courses may be substituted with adviser's approval. Courses shown without parentheses are required.)

	UNITS
<b>Written/Oral Expression</b> .....	<b>7-8</b>
See College requirement .....	7-8
<b>Preparatory Subject Matter</b> .....	<b>65-70</b>
Biological sciences (Biological Sciences 1A, 1B, 1C) .....	15
Chemistry (Chemistry 1A-1B-1C, 5, 128A-128B-128C) .....	28
Computer science (Agricultural Science and Management 21) .....	3
Environmental sciences (Environmental Toxicology 10 or Environmental Studies 10) .....	3-4
Mathematics (Mathematics 16A-16B or 21A-21B) .....	6-8
Physics (Physics 1A-1B or 6A-6B) .....	6-8
Statistics (Statistics 13) .....	4
<b>Breadth/General Education</b> .....	<b>36</b>
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.) .....	24
Additional breadth in humanities and social sciences .....	12
<b>Depth Subject Matter</b> .....	<b>29</b>
Biochemistry (Biochemistry 101A-101B) .....	6
Environmental Toxicology 101, 112A-112B, 114A-114B, 138 (128, 130A-E, 131, 132) .....	23
<b>Restricted/Other Electives</b> .....	<b>24</b>
Electives selected for area of specialization with adviser's approval	
<b>Unrestricted Electives</b> .....	<b>13-19</b>
<b>Total Units for the Degree</b> .....	<b>180</b>

**Major Adviser:** W.W. Kilgore.

**Advising Center** for the major, is in 4111 Meyer Hall (916-752-1042).

### Minor Program Requirements:

	UNITS
<b>Environmental Toxicology</b> .....	<b>18</b>
Environmental Toxicology 101, 112A, 114A, 138 .....	12
Elective courses 6 units minimum, selected from Environmental Toxicology 128, 198 and 199 (4 units combined maximum), 10, 130A-E, 131, 132, 190 .....	6

**Minor Adviser:** M.G. Miller.

**Related Courses:** See Atmospheric Science 149A, Resource Sciences 131, Environmental Studies 10, 121, 126, Wildlife and Fisheries Biology 153, Water Science 41.

**Graduate Study.** Programs of study leading to M.S. and Ph.D. degrees are available in the areas of Pharmacology and Toxicology, Ecology, and Agricultural and Environmental Chemistry. For information on graduate study, contact the Advising Office or the appropriate graduate adviser. Refer also to the Graduate Division section in this catalog.

**Graduate Advisers.** B.W. Wilson (*Pharmacology and Toxicology*), T. Shibamoto and W.W. Winterlin (*Agricultural and Environmental Chemistry*).

### Courses in Environmental Toxicology

#### Lower Division Courses

**10. Introduction to Toxicology (3) III. Kilgore**  
Lecture—3 hours. Prerequisite: open to science and non-science majors. Study of some natural and man-made toxic substances in personal, occupational, community, and global environments. Emphasis placed upon occurrence, properties, and effects of toxic substances. Biological and physical factors which alter fate of substances are described.

**92. Internship (1-12) I, II, III.** The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work-learn 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.)

**99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

#### Upper Division Courses

**101. Principles of Environmental Toxicology (3) I.** Matsumura (Chairperson in charge)  
Lecture—3 hours. Prerequisite: Chemistry 8B, 128B, or the equivalent; Biochemistry 101A recommended. The fate, consequences, and assessment of toxicants in environmental and biological systems; classes of environmental toxicants discussed include pesticides, air and water pollutants, phyto-toxins, mycotoxins, food-borne toxicants, and heavy metals.

**112A. Toxicants in the Environment (3) II.** Crosby, Seiber

Lecture—3 hours. Prerequisite: course 101 or consent of instructor. Properties of toxic chemicals which influence their distribution and transformations; action of environmental forces which affect toxicant breakdown, movement, and accumulation; sources and occurrence of major classes of environmental toxicants.

**112B. Toxicants in the Environment (4) III.** Burau, Shibamoto

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 5; course 112A; consent of instructor. Continuation of 112A. Toxic chemicals—primarily pollutants—in the environment; concepts and techniques of sampling, detecting, and measuring toxicants of current concern; collection, interpretation, and use of analytical data. Limited enrollment. Environmental Toxicology majors will be given preference for enrollment.

**114A. Biological Effects of Toxicants (3) II.** Rice

Lecture—3 hours. Prerequisite: Biochemistry 101B (may be taken concurrently); course 101 and Physiology 110 recommended. Course designed to illustrate the biological effects of toxic substances in living organisms. Topics to be covered: fate and mechanism-of-action of representative toxins, types of effects, symptoms, and antidotes.

**114B. Biological Effects of Toxicants: Comparative Aspects (4) III.** Kilgore, Miller

Lecture—1 hour; discussion—2 hours; laboratory—3 hours. Prerequisite: course 114A and consent of instructor. Course designed to illustrate basic principles of toxicology and to acquaint students with laboratory techniques for evaluating potential toxicity of chemicals. Continuation of course 114A. Limited enrollment. Environmental Toxicology majors will be given preference for enrollment.

**128. Food Toxicology (3) III.** Shibamoto, Gruenwedel (Food Science and Technology)

Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B. 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.)

**130A-E. Selected Topics in Environmental Toxicology (3) I, II, III.** The Staff (Chairperson in charge)

Lecture-discussion—3 hours. Prerequisite: consent of instructor; course 101 recommended. Selected topics of current interest in environmental toxicology. Topics will vary each time the course is offered, and will emphasize such areas as the microbiology of toxic substances, poisonous plants and animals, chemical ecology, toxic substances in food, and the safe handling of toxic substances.

**\*131. Air Pollutants and Inhalation Toxicology (3) III.** Hsieh, Last (Internal Medicine)

Lecture—3 hours. Prerequisite: Chemistry 8B (may

be taken concurrently) or the equivalent; Biochemistry 101A recommended. Toxicology of air pollutants in the ambient and occupational environments. Environmental fates, biological effects, air-quality criteria and standards, and pulmonary responses to these pollutants. Offered in even-numbered years.

**\*132. Chromatography for Analytical Toxicology**

(4) II. The Staff (Chairperson in charge)

Discussion—1 hour; laboratory—8 hours; slide demonstrations and extensive library assignments. Prerequisite: Chemistry 8B or the equivalent (may be taken concurrently); consent of instructor. Application and theory of basic chromatographic techniques such as thin-layer, gas-liquid, high-pressure liquid and column chromatography useful for analytical toxicology; residue analysis comprises one-third of course.

**138. Legal Aspects of Environmental Toxicology**

(3) II. Li

Lecture—3 hours. Prerequisite: consent of instructor; courses 10 and 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 governmental control.

**190. Seminar (1)** I. The Staff (Chairperson in charge)

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.)

**190C. Research Group Conference (1)** I, II, III. The Staff

Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference of advanced research methods and the interpretation of research results. (P/NP grading only.)

**192. Internship (1-12)** I, II, III. The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learn 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.)

**197T. Tutoring in Environmental Toxicology (1-5)**

I, II, III. The Staff (Chairperson in charge)

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.)

**198. Directed Group Study (1-5)** I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)** I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses**

**\*203. Environmental Toxicants (4)** II. Crosby

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 even-numbered years.

**214. Mechanisms of Toxic Action (3)** III. Hammock, Miller

Lecture—3 hours. Prerequisite: Biochemistry 101A-101B and consent of instructor. Biochemical and physiological mechanisms underlying toxicity and detoxification.

**220. Analysis of Toxicants (3)** I. Seiber

Lecture—3 hours. Prerequisite: course 101 and con-

sent of instructor; course 203 recommended. Principles of the microanalysis of toxicants. Theoretical considerations regarding separation, detection, and quantitative determination of toxicants using chemical and instrumental techniques.

**220L. Analysis of Toxicants Laboratory (2)** I. Seiber

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.

**228. Gas Chromatography/Mass Spectrometry of Toxic Chemicals (3)** I. Shibamoto

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 220 and Chemistry 219; 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. Offered odd-numbered years.

**234. Neurophysiological Basis of Neurotoxicology (3)** I. Woolley

Lecture—2/1 hours; discussion—1/2 hour. Prerequisite: Physiology 110 (or the equivalent) and basic understanding of neurophysiology; consent of instructor. Mechanisms of action of a number of different neurotoxins, including marine toxins, insecticides, and heavy metals. Examples of ways toxins may act on the nervous system and techniques for study of neurotoxicology. Offered in odd-numbered years. (Same course as Physiology 234.)

**290. Seminar (1)** I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Current topics in environmental toxicology. (S/U grading only.)

**290C. Advanced Research Conference (1)** I, II, III.

The Staff (Chairperson in charge)

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.)

**297T. Tutoring in Environmental Toxicology (1-5)**

I, II, III. The Staff (Chairperson in charge)

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)** I, II, III. The Staff (Chairperson in charge)

**299. Research (1-12)** I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

Ian A. Gardner, B.V.Sc., Ph.D., Assistant Professor

<sup>2,3</sup>Constantin Genigeorgis, D.V.M., Ph.D., Professor

John S. Glenn, D.V.M., Ph.D., Lecturer

Lynette A. Hart, M.A., Ph.D., Assistant Adjunct Professor

David W. Hird, D.V.M., Ph.D., Associate Professor

Jack A. Howarth, D.V.M. Ph.D., Professor Emeritus

David A. Jessup, D.V.M., M.P.V.M., Lecturer

Carolyn S. Kopper, M.L.S., Lecturer

Kenneth M. Lam, Ph.D., Associate Professor

Richard H. McCapes, D.V.M., Senior Lecturer

Duncan McMartin, D.V.M., Ph.D., Lecturer

Margaret E. Meyer, Ph.D., Professor Emeritus

Ben B. Norman, D.V.M., Ph.D., Lecturer

Hans P. Riemann, D.V.M., Ph.D., Professor

Walter W. Sadler, D.V.M., M.P.H., Professor Emeritus

Calvin W. Schwabe, D.V.M., M.P.H., Sc.D., Professor

Patton L. Smith, D.V.M., M.P.V.M., Lecturer

Frederick Stevens, D.V.M., M.S., Lecturer

George B. E. West, D.V.M., M.P.V.M., Lecturer

Richard Yamamoto, Ph.D., Professor

George K. York, Ph.D., Lecturer

**Part-Time Clinical Faculty**

Galestan Ghazikhanian, D.V.M., Ph.D., Associate Clinical Professor

**Courses in Epidemiology and Preventive Medicine**

**Upper Division Courses**

**104. History of Veterinary Medicine (3)** III.

Schwabe

Lecture—2 hours; discussion—1 hour. Veterinary medicine's role (from man's first domestication of animals to the decline of Rome) in building a foundation for rational healing; and its contributions during the eighteenth-twentieth centuries to the creation of modern medicine.

**106. Human-Animal Interactions: Benefits and Issues (2)** I. Hart

Lecture—2 hours. 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. Offered in even-numbered years.

**111. Animal Hygiene (3)** II. McCapes

Lecture—3 hours. Prerequisite: Biological Sciences 1A or consent of instructor. Causes, prevention, and control of animal diseases important in economic agriculture and in public health, with emphasis upon animal management factors in disease.

**150. Food-borne Infections and Intoxications (4)**

II. Genigeorgis, York

Lecture—4 hours. Prerequisite: Microbiology 2. Prevalence and characteristics of those diseases of man which are derived from food or food sources; access of disease agents to and distribution in food and food sources; exposure of man to these agents; prevention of food-borne diseases.

**199. Special Study for Advanced Undergraduates (1-5)** I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses**

**202. Sampling in Health-Related Research (3)** I.

Farver

Lecture—3 hours. Prerequisite: course 403 or the equivalent; consent of instructor. Thorough coverage of simple random sampling, stratified sampling, cluster sampling, and systematic sampling. Emphasis is on applied sampling techniques, but includes measurement and survey execution. Offered in even-numbered years.

**\*203. Selected Topics in Medical Statistics (3)** I.

Farver

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 404 or the equivalent; consent of instructor. Selected topics in medical statistics as applied to the design and data analysis used in epidemiological research. Possible topics (chosen to suit interests and needs of each class) include: regression analy-

sis; cross-categorical techniques, lifetables; survivorship functions. Offered in odd-numbered years.

**212. Epidemiology of the Zoonoses (3) II.**

Lecture—1 hour; discussion—2 hours. Prerequisite: course 405 or consent of instructor. Biological and ecological features of infections shared by man and other animals with particular attention to those perpetuated in nature by wildlife and those which are of greater public health and economic significance.

**216. Immunodiagnostic Techniques (3) II.**

Yamamoto, Lam

Lecture—3 hours. Prerequisite: enrollment in MPVM degree program or consent of instructor. Consideration of immunodiagnostic techniques for screening of animal populations for disease. Emphasis on rapid, simple, and inexpensive procedures for mass screening.

**216L. Immunodiagnostic Techniques Laboratory (2) II.** Yamamoto, Lam

Discussion—1 hour; laboratory—2 hours. Prerequisite: course 216 (may be taken concurrently) or consent of instructor. Application and interpretation of serologic techniques for diagnosis of animal diseases. (S/U grading only.) Limited enrollment.

**217. Evaluation of Screening Tests (1) III.**

Yamamoto

Discussion—2 hours (alternate weeks). Prerequisite: consent of instructor. Evaluation of screening tests (biochemical, serological, or hematological) in the context of the population in which the test is performed to demonstrate how changes in various population parameters will influence test efficiency. Offered in odd-numbered years.

**219. Mycoplasma as Agents of Disease (2) III.**

Yamamoto, Lam

Lecture—2 hours. Prerequisite: Veterinary Microbiology and Immunology 127 or the equivalent or consent of instructor. Offered in even-numbered years.

**220. Advanced Avian Medicine (3) III.** Yamamoto, Lam

Lecture—3 hours. Instruction on the methods of prevention of the major diseases of domestic poultry.

**222. Epidemiological Modeling (2) III.** Carpenter

Lecture—1 hour; discussion—2 hours. Prerequisite: courses 403 and 406 (may be taken concurrently). Techniques of model-building and simulation of infectious diseases will be explored. Epidemiological modeling philosophy, construction, and validation will be emphasized.

**225. Preventive Avian Medical Practice (3) III.** The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: enrollment in avian medicine option of MPVM program, third- or fourth-year standing in School of Veterinary Medicine, or consent of instructor. Discussion of the economic structure of the broiler, commercial egg and turkey industries, and the delivery of preventive veterinary medical services within these industries. Specific prevention and eradication programs pertaining to diseases of economic importance are covered.

**240. Veterinary Medicine and Human Health (3) III.**

Schwabe

Lecture—2 hours; discussion—1 hour. Prerequisite: professional veterinary or graduate standing or consent of instructor. Fulfillment of veterinary medicine's historic and newer roles as a human health profession; emphases on zoonoses prevention, comparative medical research, monitoring environmental hazards, organized efforts to promote humane values and mental health.

**242. International Veterinary Medicine: The World Food/Population Problem (3) II.** Schwabe

Lecture—2 hours; discussion—1 hour. Prerequisite: professional veterinary or graduate standing or consent of instructor. Survey of the world food-population problem, emphasizing effects of animal diseases and their control upon production of foods of animal and plant origin; comparisons of important Third World and other situations; discussion of current and future prospects.

**254. Public Health Aspects of Meat and Meat Products Technology (3) III.** Genigeorgis

Lecture—3 hours. Prerequisite: consent of instructor. Study of the influence of techniques and procedures for processing meats and meat products upon their wholesomeness as food.

**255. Animal Health Economics (3) II.** Carpenter

Lecture—3 hours. Prerequisite: consent of instructor. Basic concepts of microeconomics (production and cost functions, firm decision making, and the market place) as they relate to animal health are considered. Application of economic decision making techniques which may be used in veterinary medicine are also presented.

**290. Current Topics in Avian Medicine (1) I, II, III.**

Lam, Yamamoto

Seminar—1 hour. Prerequisite: consent of instructor. Topics from the current literature in avian medicine will be assigned to students for discussion and interpretation.

**291. Seminars in Epidemiology (1) III.**

Seminar—1 hour. Participants will present and discuss ongoing or published research projects in epidemiology. Emphasis will be on study design and data analysis. (S/U grading only.)

**298. Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

**299. Research (1-12) I, II, III.** The Staff (Chairperson in charge) (S/U grading only.)

**Professional Courses**

**400. Orientation to Statistics (4) I.**

Lecture—40 hours total. Prerequisite: enrollment in MPVM degree program. Introduction and overview to the concepts basic to biostatistics and epidemiology. (S/U grading only.)

**401. Biomedical Information Resources and Retrieval (3) I.**

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: consent of instructor. Use of bibliographic tools for retrieval of biomedical literature; sources of epidemiological and statistical data; computerized retrieval of information; preparation of bibliographies.

**402. Medical Statistics I (3) I.**

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 400 or Statistics 13 (or the equivalent); consent of instructor. Use of statistics in clinical, laboratory, and population medicine; graphical and tabular presentation; probability; binomial, normal, t-, F-, and Chi-square distributions; elementary nonparametric methods; introductory methods in regression and correlation; lifetables.

**403. Medical Statistics II (3) II.**

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 402 or consent of instructor. Continuation of course 402. Analysis of variance in biomedical sciences; nonparametric methods; problems in sampling and surveys; time dependent variation and trends; biomedical applications of statistical methods.

**404. Medical Statistics III (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 403 or consent of instructor. Continuation of course 403. Multiple regression; discriminant analysis; analysis of covariance; analysis of multiway frequency tables; biomedical applications.

**405. Principles of Epidemiology (5) I.** Hird

Lecture—2 hours; discussion—2 hours; laboratory—2 hours. Prerequisite: course 400 or the equivalent; a degree in veterinary medicine, medicine or dentistry, or consent of instructor. Combination of lectures, class discussions, and problem solving. Topics are methods of investigating disease outbreaks, quantitating disease in populations, medical ecology survey methods, an introduction to epidemiologic study design and animal disease surveillance.

**406. Epidemiologic Study Design (3) II.** Hird

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 403 (may be taken concurrently) and 405, or consent of instructor. Design and interpretation of cross-sectional, case-control,

and cohort studies (including controlled clinical trials), with examples pertinent to veterinary medicine. Critical review of published epidemiologic studies. Principles of association and causality.

**407. Analytical Epidemiology (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 406 and 404 (may be taken concurrently).† Uses of multiple regression, discriminant analysis, factor analysis, path analysis and other multivariate techniques in epidemiology. Approaches for handling the analysis of large data sets.

**408. Research Methodology and Research Reports (3) I.**

Lecture—1 hour; discussion—2 hours. Prerequisites: enrolled in MPVM degree program or consent of instructor.† Application of the experimental method to solving specific epidemiological field problems involving disease of animals. Students must identify and select a problem, and complete all work preparatory to the actual field collection of data or specimens.

**409A-409B. Topics in Data Analysis (2-3) II-III.** The Staff (Chairperson in charge)

Discussion—2 hours (409A); discussion—3 hours (409B). Prerequisite: course 406 (may be taken concurrently)† or consent of instructor. Emphasis on decision making with respect to the type and amount of data required for solving epidemiological problems and the selection and use of appropriate data in statistics and economics for processing, analyzing, and interpreting these data. (Deferred grading only, pending completion of course.)

**410A-410B. Topics in Applied Epidemiology (3-2) II-III.** The Staff (Chairperson in charge)

Discussion—3 hours (410A); discussion—2 hours (410B). Prerequisite: course 406 (may be taken concurrently)† or consent of instructor. Collection of data, and/or specimens from field studies, serum banks or data banks. Laboratory examination of specimens and recording of results. Alternative approaches to presentation of data and conclusions and formulations of recommendation for further investigations. (Deferred grading only, pending completion of course.)

**411. Disease Control and Eradication (3) III.** Riemann

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 222 (may be taken concurrently), 255, 405. Studies of various approaches to control or eradicate disease in animal populations. Design and economic analysis of control programs.

**412A. Use of Microcomputers: Level 1 (3) I.**

Stevens

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Introduction to and development of skills on modern microcomputers for students involved in epidemiological studies and research. Level one topics include microcomputer anatomy, operating systems, file handling, fundamentals of word processing, spreadsheets, and statistical analysis software.

**412B. Use of Microcomputers: Level 2 (3) II.**

Stevens

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 412A or consent of instructor. Development of intermediate skills on modern microcomputers for students involved in epidemiological studies and research. Level two topics include advanced use of word processing and spreadsheet software, and introduction to database management programs.

**412C. Use of Microcomputers: Level 3 (3) III.**

Stevens

Lecture—1 hour; laboratory—4 hours. Prerequisite: course 412B or consent of instructor. Development of advanced skills on modern microcomputers for students involved in epidemiological studies and research. Level three topics include advanced use of database management programs, and development of application programs to facilitate the students' research efforts.

## Family Practice

See Medicine, School of

## Fermentation Science

(College of Agricultural and Environmental Sciences)

### The Major Program

The Fermentation Science major is a program of study of the fundamental and applied sciences related to the use of microorganisms as production and processing agents. A broad interdisciplinary food-related education is offered which may be combined with specializations in *enology* (wine studies), *brewing science*, and *fermentation* of other foods and beverages. Industrial fermentations such as those used in the production of microbial cells, drugs, enzymes, solvents, acids, and vitamins, in the expansion of the food supply, and preservation of the environment, are further opportunities for study. Courses are selected in consultation with advisers. Graduates qualify for supervisory, technical, research, sales or executive positions in the food, beverage, and allied industries, in the fermentation industries, and in governmental agencies.

The major can provide preparation for graduate study in food science, microbiology, agricultural and environmental chemistry or biochemistry.

### B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirement are shown in parentheses where possible. Equivalent or more comprehensive courses will be accepted.)

UNITS

**Written/Oral Expression** ..... 7-8

See College requirement ..... 7-8

**Preparatory Subject Matter** ..... 59-66

Biochemistry (Biochemistry 101A, 101B) ..... 6

Biology (Biological Sciences 1A) ..... 5

Chemistry (Chemistry 1A-1B-1C, 5, and 8A-8B; or 4A-4B-4C and 128A-128B, 129A) ..... 21-25

Computer science (Agricultural Science and Management 21, Computer Science Engineering 10, 30, or Engineering 5) ..... 3-4

Mathematics (Mathematics 16A-16B or 21A-21B) ..... 6-8

Microbiology (Microbiology 102-102L) ..... 6

Physics (Physics 6A, 6B) ..... 8

Statistics, including analysis of variance (Agricultural Science and Management 150 or Statistics 106) ..... 4

**Breadth/General Education** ..... 24

Satisfaction of General Education requirement (in "Civilization and Culture" and/or "Contemporary Societies") plus additional course work in social sciences and humanities or others as approved by adviser to total 24 units.

**Depth Subject Matter** ..... 40

Choose from:

- Chemistry 107A, 107B, 130
- Chemical Engineering 161, 206
- Epidemiology and Preventive Medicine 150 (or Food Science and Technology 104)
- Food Science and Technology 102, 102L, 104, 104L, 108, 109, 110A, 110B, 150, 150L, 205, 235, 250, 250L
- Genetics 100
- Microbiology 105, 130A, 130B, 130L

Viticulture and Enology 3, 123, 124, 125, 126, 127, 135, 140, 186, 217, 219 235 (no variable-unit 190, 192, 199, 299 courses allowed toward depth requirement)

(Courses in depth subject matter may not be taken on the P/NP grading basis. Overall GPA in depth subject matter must be 2.0 or greater)

**Restricted Electives** ..... 28

Selected according to student's educational goals and upon approval by adviser.

Only 6 units of 192 or 6 units of 190, 199, or 298 may be counted; or a total of 8 units of these courses combined.

**Unrestricted Electives** ..... 14-22

**Total Units for the Degree** ..... 180

**Major Adviser.** R. E. Kunkee (*Viticulture and Enology*).

**Graduate Study.** Refer to the Graduate Division degree programs in Agricultural and Environmental Chemistry, Biochemistry, Chemical Engineering, Food Science, Genetics, Microbiology.

## Fiber and Polymer Science

(College of Agricultural and Environmental Sciences)

### 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. All students in this major are required to 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, the student is expected to select from courses from areas such as computer science and mathematics, chemistry, marketing and management, material and advanced fiber and polymer science, and textiles. The major prepares the student for a career in fiber or polymer science and related areas including research and development, technical marketing and management, production, quality control, and science teaching (on completion of an additional year in the teaching credential program). Graduates are prepared to enter the graduate program in Textiles or Agricultural and Environmental Chemistry with a specialization in Fiber and Polymer Chemistry, and textile science or fiber and polymer programs at other universities.

### B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirement are shown in parentheses where possible. Equivalent or more comprehensive courses will be accepted.)

UNITS

**Written and Oral Expression** ..... 11

See College requirement ..... 8

Additional English (English 104) ..... 3

**Preparatory Subject Matter** ..... 55-58

Chemistry (Chemistry 1A, 1B, 1C, 5) ..... 19

Computer science (Computer Science Engineering 10) ..... 3

Mathematics (Mathematics 16A, 16B, 16C or 21A, 21B, 21C) ..... 9-12

Physics (Physics 5A, 5B, 5C or 9A, 9B, 9C) ..... 12

Statistics (Statistics 13 or Agricultural Science and Management 150) ..... 4

Textiles and clothing (Textiles and Clothing 6 and 8, or Engineering 45) ..... 8

**Breadth/General Education** ..... 6-24

Satisfaction of General Education requirement

**Depth Subject Matter** ..... 37

Textiles and clothing (Textiles and Clothing 100, 150, 161, 161L, 163, 163L, 180A, 180B) ..... 18

Chemistry (Chemistry 128A, 128B, 128C, 129A, 129B, 110A and 110C or 107A and 107B) ..... 19

**Restricted Electives** ..... 30

Select courses from the following:

*Computer Science and Mathematics:*

Agricultural Science and Management

21; Engineering 5; Applied Science

Engineering 115, 116; Food Science and Technology 156; Mathematics 22A, 22B

*Chemistry:*

Chemistry 108, 111, 115, 120, 121, 124A, 124B, 124C, 130, 131, 140

*Marketing/Management:*

Agricultural Economics 100A, 100B, 113, 136, 157, Economics 1A, 1B, Statistics 103

*Material and Advanced Fiber/Polymer Science:*

Aeronautical Science Engineering 137, Engineering 104A, 104B, Textiles and Clothing 250A-F, 290, 293

*Textiles:*

Textiles and Clothing 162, 162L, 164, 173, 174, 220

**Unrestricted Electives** ..... 20-41

**Total Units for the Degree** ..... 180

**Major Adviser.** Y.L. Hsieh (*Textiles and Clothing*).

**Advising Center** for the major is located in 129 Everson Hall (916-752-4417).

## Minor Program Requirements:

UNITS

**Fiber and Polymer Science** ..... 18

Textiles and Clothing 6 or Engineering 45 ..... 4

Textiles and Clothing 100, 150, 161, 161L, 163 and 163L or 180A and 180B ..... 14

**Minor Adviser.** Y.L. Hsieh (*Textiles and Clothing*).

## Fisheries

**See Animal Science; and Wildlife and Fisheries Biology**

## Food Biochemistry

(College of Agricultural and Environmental Sciences)

### The Major Program

The major in Food Biochemistry stresses the principles of chemistry and biochemistry as related to constituents of foods and the changes which occur in the constituents before and during storage and on processing. Particular emphasis is placed on the role of and changes in the carbohydrates, lipids, proteins, enzymes, and nucleic acids and their effect on the quality attributes of foods. Through the appropriate choice of both electives and in-depth courses in food science and technology, the major offers broad education to students planning careers in food processing, food research, and other food-related fields.

The major also offers excellent preparation for graduate work in agricultural chemistry, biochemistry, nutrition, medicine, and in the life sciences.

### B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITS

<b>Written/Oral Expression</b> .....	<b>7-8</b>
See College English requirement .....	7-8
<b>Preparatory Subject Matter</b> .....	<b>73-81</b>
Biochemistry (Biochemistry 101A, 101B) .....	6
Biology (Biological Sciences 1A) .....	5
Chemistry (Chemistry 1A-1B-1C, 5 or 4A-4B-4C; 128A-128B-128C, 129A; 107A-107B or 110A-110B) .....	32-36
Mathematics, (Mathematics 16A-16B-16C or 21A-21B-21C) .....	9-12
Microbiology (Microbiology 102, 102L) .....	6
Physics (Physics 6A-6B-6C or 8A-8B-8C) .....	12
Other (one course from Computer Science Engineering 10, 30, Engineering 5, Mathematics 22A, 22B, 22C, Statistics 13, Agricultural Science and Management 150) .....	3-4
<b>Breadth/General Education</b> .....	<b>24</b>
Satisfaction of General Education requirement .....	24
<b>Depth Subject Matter</b> .....	<b>30</b>
Food Science and Technology (to include Food Science and Technology 103, 104, 104L, 110A or 111) .....	25
Biochemistry (Biochemistry 123, 123L) .....	5
<b>Restricted Electives</b> .....	<b>24</b>
At least one upper division biochemistry course, other than Biochemistry 101A, 101B, 101L. One nutrition course other than Nutrition 10. Remaining courses can be selected from biochemistry, physiology, environmental toxicology, genetics, public health, microbiology or other subjects related to Food Science .....	24
<b>Unrestricted Electives</b> .....	<b>13-22</b>
<b>Total Units for the Degree</b> .....	<b>180</b>

**Major Adviser.** G.M. Smith (*Food Science and Technology*).

**Graduate Study.** Refer to the Graduate Division section in this catalog.

as research supervisors, in regulatory agencies, in policy and management positions. Graduate study for the Food Science student may lead to the M.S. degree in Food Science or the Ph.D. degree in related fields such as agricultural chemistry, biochemistry, microbiology and nutrition.

### B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITS

<b>Written/Oral Expression</b> .....	<b>7-8</b>
See College requirement .....	7-8
<b>Preparatory Subject Matter</b> .....	<b>56-60</b>
Biochemistry (Biochemistry 101A-101B) .....	6
Biological sciences (Biological Sciences 1A; Microbiology 102, 102L) .....	11
Chemistry (Chemistry 1A-1B-1C-5 or 4A-4B-4C; 8A-8B) .....	21-25
Mathematics (Mathematics 16A-16B) .....	6
Physics (Physics 5A-5B) .....	8
Statistics (Agricultural Science and Management 150 or Statistics 13) .....	4
<b>Breadth/General Education</b> .....	<b>29</b>
Satisfaction of General Education requirement plus social science and humanities electives to total 29 units .....	29
<b>Depth Subject Matter</b> .....	<b>24</b>
Food Science and Technology 100A, 100B, 103, 104, 104L, 110A, 110B, and 190 .....	24
<b>Restricted Electives</b> .....	<b>37-41</b>
One course in nutrition; one upper division course in Food Science and Technology and other courses selected in accordance with student's educational goal and upon approval of faculty adviser .....	37-41
<b>Unrestricted Electives</b> .....	<b>18-27</b>
<b>Total Units for the Degree</b> .....	<b>180</b>

**Major Adviser.** D.S. Reid (*Food Science and Technology*).

**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 and Technology

(College of Agricultural and Environmental Sciences)

R. Larry Merson, Ph.D., Chairperson of the Department

Department Office, 126 Cruess Hall (916-752-1465)

### Faculty

Everett Bandman, Ph.D., Associate Professor

Ericka L. Barrett, Ph.D., Professor

Richard A. Bernhard, Ph.D., Professor

John Bruhn, Ph.D., Lecturer

Edwin B. Collins, Ph.D., Professor Emeritus

Walter L. Dunkley, Ph.D., Professor Emeritus

Robert E. Feeney, Ph.D., Professor Emeritus

J. Bruce German, Ph.D., Assistant Professor

Dieter W. Gruenwedel, Ph.D., Professor

Norman F. Haard, Ph.D., Professor

Jerald M. Henderson, D. Engr., Professor (*Food Science and Technology, Mechanical Engineering*)

Walter G. Jennings, Ph.D., Professor Emeritus

John M. Krochta, Ph.D., Professor (*Food Science and Technology, Agricultural Engineering*)

Michael J. Lewis, Ph.D., Professor

Bor S. Luh, Ph.D., Professor Emeritus

George L. Marsh, M.S., Professor Emeritus

Mendel Mazelis, Ph.D., Professor

Kathryn L. McCarthy, Ph.D., Assistant Professor (*Food Science and Technology, Agricultural Engineering*)

Michael J. McCarthy, Ph.D., Assistant Professor (*Food Science and Technology, Agricultural Engineering*)

R. Larry Merson, Ph.D., Professor (*Food Science and Technology, Agricultural Engineering*)

Martin W. Miller, Ph.D., Professor Emeritus

David M. Ogrydziak, Ph.D., Professor

Michael A. O'Mahony, Ph.D., Professor

Herman J. Phaff, Ph.D., Professor Emeritus

Chester W. Price, Ph.D., Associate Professor

Robert J. Price, Ph.D., Lecturer

David S. Reid, Ph.D., Professor

Thomas Richardson, Ph.D., Professor (*Peter J. Shields Professor in Dairy Food Science*)

Gerald F. Russell, Ph.D., Professor

Barbara O. Schneeman, Ph.D., Professor (*Food Science and Technology, Internal Medicine, Nutrition*)

C.F. Shoemaker, Ph.D., Associate Professor

Elizabeth O. Shuster, Ph.D., Assistant Professor

R. Paul Singh, Ph.D., Professor (*Food Science and Technology, Agricultural Engineering*)

Gary M. Smith, Ph.D., Associate Professor

Lloyd M. Smith, Ph.D., Professor Emeritus

Clarence Sterling, Ph.D., Professor Emeritus

Aloys L. Tappel, Ph.D., Professor

John R. Whitaker, Ph.D., Professor

Gideon Zeidler, D.Sc., Lecturer

**Major Program and Graduate Study.** See the major in Food Science; and for graduate study, refer to the Graduate Division section in this catalog.

**Related Courses.** See courses in Biochemistry and Biophysics, Consumer Science, Engineering, Nutrition, and Viticulture and Enology; Environmental Toxicology 101, Epidemiology and Preventive Medicine 150, Plant Science 112 and 112L.

## Courses in Food Science and Technology

### Lower Division Courses

**1. Food Science and Society** (3) I. Bernhard  
Lecture—2 hours; discussion—1 hour. Nature and scope of world food problem; food composition; scientific and technological aspects of converting animal and plant products into a variety of prepared

## Food Science

(College of Agricultural and Environmental Sciences)

### The Major Program

Food Science applies physical, biological, engineering, and social sciences to processing, preservation, packaging, storage, evaluation and utilization of foods. Instruction emphasizes the principles of biology, chemistry, microbiology, and other sciences as they are applied to the conversion of raw materials into processed foods. General principles are stressed, not specific food commodities.

Students completing this major receive excellent training and experience for employment in the world's largest industry, the food industry. Opportunities for employment include positions in the food and allied industries where graduates can engage in processing, sensory evaluation, quality assurance, product development, research, and management functions; in education as teachers; and in research, extension, and administration. Local, state and federal governments offer opportunities for employment

## Food Science (A Graduate Group)

Norman F. Haard, Ph.D., Chairperson of the Group  
Group Office, 1480 Chemistry Annex (916-752-1415)

**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 — under Plan I (thesis) and Plan II (comprehensive oral examination) — and to the Ph.D. degree. Areas of emphasis include Chemistry-Biochemistry, Engineering-Technology, Enology, Microbiology, and Sensory Sciences in the M.S. program and Biochemistry, Chemistry, and Microbiology in the Ph.D. program. Detailed information regarding graduate study is available through the Group Chairperson or by obtaining the *Graduate Announcement*.

**Graduate Advisers.** Contact the Graduate Division for the list of advisers.

foods; improvement and evaluation of acceptability and nutritional value of foods. Not open for credit to students who have received credit for course 100A, 100B, or 111.

**2. Introductory Food Science (3) III.** Lewis, O'Mahony

Lecture—3 hours. Nature of scientific method, the world food problem, food composition, nutritional and sensory aspects of food, food preservation, food safety, environmental consequences of food technology. Not open to students who have received credit for course 1, 100A, 100B, or 111. General Education credit: Nature and Environment/Introductory.

**49. Processing Plant Studies (1) III.**

Discussion—1 hour; field trips—3 hours. Field trips to observe processing, distribution, quality control and regulatory control of foods and related materials.

**93. Public Issues in Nutrition and Food Science (1) II.** Schneeman

Seminar—1 hour. Faculty and invited guest speakers will present topics in the area of nutrition and food science which are currently subjects of public debate. Intended as an introduction to nutrition and food science for students new to the campus. (P/NP grading only.) (Same course as Nutrition 93.)

**99. Special Study for Undergraduates (1-5) I, II, III.**

The Staff (Merson in charge)  
(P/NP grading only.)

**Upper Division Courses**

**100A. Principles of Food Composition and Properties (3) I.** Shoemaker

Lecture—3 hours. Prerequisite: Chemistry 8A-8B. Fundamental chemical, physical, and sensory aspects of food composition as they relate to physical properties, acceptability, and nutritional value of fresh and processed foods.

**100B. Principles of Food Composition and Properties (3) II.** Russell, Schneeman

Lecture—3 hours. Prerequisite: Chemistry 8A-8B. Fundamental chemical, physical, and sensory aspects of food composition as they relate to physical properties, acceptability, and nutritional value of fresh and processed foods.

**101A. Principles of Food Composition and Properties Laboratory (2) I.** Shoemaker

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100A (may be taken concurrently). Course designed to give laboratory experience with the food systems and properties described in course 100A.

**101B. Principles of Food Composition and Properties Laboratory (2) II.** Mazelis

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100B (may be taken concurrently). Course designed to give laboratory experience with the food systems and properties described in course 100B.

**102. Malting and Brewing Science (3) I.** Lewis

Lecture—3 hours; optional field trip. Prerequisite: Biochemistry 101A. Technology of the malting, brewing, and fermentation processes is integrated with the chemistry, biochemistry, and microbiology that determine industrial practices and product quality.

**102L. Malting and Brewing Science Laboratory (3) II.** Lewis

Discussion—1 hour; laboratory—6 hours. Prerequisite: courses 102, 103, Chemistry 5. Laboratory experience in the use and application of standard brewing methods of analysis. Data collection on raw materials and application of these data in pilot-scale malting and brewing exercises. Processing studies and influence of process variables on product attributes.

**103. Physical and Chemical Methods for Food Analysis (5) I.** Gruenwedel, G. Smith, Tappel

Lecture—3 hours; laboratory—6 hours. Prerequisite: Chemistry 5, 8B; Biochemistry 101B (may be taken concurrently). An introduction to the theory and application of physical and chemical methods for determining the constituents of foods. Modern separation and instrumental analysis techniques are stressed.

**104. Food Microbiology (3) II.** Barrett

Lecture—3 hours. Prerequisite: Microbiology 2, Biochemistry 101A. 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.

**104L. Food Microbiology Laboratory (3) III.** C. Price

Lecture—1 hour; laboratory—6 hours. Prerequisite: Microbiology 2 and 3; course 104. Cultural and morphological characteristics of microorganisms involved in food spoilage, in food-borne disease, and food fermentation. Analysis of microbiological quality of foods.

**107. Principles of Sensory Analysis of Foods (4) II.** Pangborn

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Agricultural Science and Management 150 or the equivalent course in statistics. Nature of sensory responses with emphasis on aroma, taste, and texture of foods; critical use of analytical laboratory methods; relation of sensory data to chemical and instrumental measurements; collection and statistical analysis and interpretation of sensory data.

**108. Food Processing Plant Sanitation (3) II.** York

Lecture—3 hours. Prerequisite: Chemistry 8B and Microbiology 2. Discussion of factors relating to sanitary control of food processing including water treatment, chemical and physical sanitizing agents, principles of cleaning and hard surface detergency, metal corrosion, concepts in the disposal of wastes and the pertinence of government control agencies.

**109. Principles of Quality Assurance in Food Processing (3) III.** Merson in charge

Lecture—2 hours; discussion—1 hour. Prerequisite: Statistics 13 or Agricultural Science and Management 150. 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.

**110A. Physical Principles in Food Processing (3) I.** Merson

Lecture—2 hours; laboratory—2 hours. Prerequisite: Physics 5A and 5C or the equivalent; calculus recommended. Not open for credit to students enrolled in College of Engineering. Applications of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, and problem solving.

**110B. Heat and Mass Transfer in Food Processing (3) II.** McCarthy

Lecture—3 hours. Prerequisite: course 110A or the equivalent; Agricultural Engineering Technology 110L recommended (may be taken concurrently). Rate processes: conduction, convection, and radiation heat transfer; microwave heating, refrigeration, freezing, psychrometrics; mass transfer during drying, and storage.

**111. Introduction to Food Processing (4) II.** Miller, Singh

Lecture—3 hours; discussion-demonstration—2 hours. Prerequisite: Microbiology 2, Chemistry 8A-8B, and Physics 5A, 5C, or the equivalent. Food processing from farm to package. Characteristics of raw materials, fresh produce handling, overview of food processing and processing unit operations, chemical additives. Demonstration and field trips

**117. The Senses, Sensory Measurement, Psychophysics, and Food (4) I.** O'Mahony

Lecture—4 hours. Prerequisite: Biological Sciences 1A; Statistics 13 or Agricultural Science and Management 150 (may be taken concurrently). Structure and function of sensory receptor systems; psychological and physiological variables affecting sensory responses. Critical examination of modern psychophysical methods for the investigation of the mechanisms of human sensory systems. Problems of sensory measurement and their relation to food flavor.

**119. Chemistry and Technology of Milk and Dairy Products (4) III.** Richardson, G. Smith

Lecture—4 hours; demonstrations and a field trip. Prerequisite: Microbiology 2, Biochemistry 101A, or 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.

**120. Principles of Meat Science (3) III.** Bandman, Lee (Animal Science)

Lecture—3 hours. Prerequisite: Biochemistry 101B or the equivalent. 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 Animal Science 120.)

**120L. Meat Science Laboratory (2) III.** Lee (Animal Science), Bandman

Discussion—1 hour; laboratory—3 hours. Prerequisite: Biochemistry 101B; course 120 (may be taken concurrently). 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. (Same course as Animal Science 120L.)

**121. Principles of Poultry Product Technology (3) I.** King (Avian Sciences)

Lecture—3 hours. Prerequisite: Biochemistry 101B (may be taken concurrently). Quality, preservation, and processing of avian products. Topics include quality control, nutrition, chemistry, biochemistry, microbiology, and functional properties.

**122. Marine Food Science (3) II.** Ogrydziak, Haard

Lecture—3 hours. Prerequisite: Microbiology 2; Biochemistry 101B (may be taken concurrently). Biochemical, microbiological, and ecological principles unique to fish; where fish are found and why; fishing and landing techniques as they influence quality; processing, storage, and public health aspects of marine organisms; resource development, including aquaculture. Offered in even-numbered years.

**125. Corrosion Principles in Food Processing**

**Interactions (3) II.** Gruenwedel

Lecture—3 hours. Prerequisite: Mathematics 16B; Physics 5B; Chemistry 8B. Course presents thermodynamic and kinetic principles of container-product interactions (internal corrosion) and investigates how these interactions affect the wholesomeness of processed, canned foods.

**128. Food Toxicology (3) III.** Gruenwedel, Shibamoto (Environmental Toxicology)

Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B. 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.)

**131. Packaging Processed Foods (3) III.** Singh, Henderson, Zeidler

Lecture—3 hours. Prerequisite: course 1 or 111, Chemistry 8B, Microbiology 2 and Physics 5C, or consent of instructor. Technical aspects of packaging processed foods. Definitions and functions of packages for food. Packaging materials and properties. Public health problems associated with packaging. Food-packaging interactions for major commodities and their control.

**140. Food Laws and Regulation (3) I.** Loiseaux (Law)

Lecture—3 hours. Prerequisite: upper division standing. Legal and scientific issues involved in the regulation of the nation's food supply and nutritional status. Philosophy underpinning the application of regulatory statutes. Sources of information necessary for communication with government on public food policy information.

**150. Thermal Processing of Foods (3) III.** Merson

Lecture—2 hours; discussion, demonstration, and problem workshops—2 hours. Prerequisite: courses 104 and 110B or the equivalent. Theory and practi-

cal considerations of thermal processes by canning, pasteurization, and aseptic processing. Process calculations of microbial inactivation and chemical changes to safeguard public health, nutrition, and consumer acceptance. Description and engineering analysis of thermal processing equipment.

**150L. Thermal Processing Laboratory (2) III. Merson**

Laboratory—6 hours. Prerequisite: courses 104 and 110B; course 150 (may be taken concurrently). Laboratory exercises and student participation in the use and application of thermal processing methods and related procedures, and the interpretation of results, including evaluation of can closures, operation of thermal processing equipment, and the development and testing of sterilization processes.

**151. Freezing Preservation of Food (3) II. Reid**

Lecture—3 hours. Prerequisite: course 110B, Microbiology 2, and Chemistry 8B; course 104 recommended. Freezing of model systems and food with emphasis on physicochemical aspects. Consequences of food freezing and thawing. Modeling of freezing for predictive purposes. Visualization and characterization of frozen materials. Offered in odd-numbered years.

**156. Computer Interfacing for Laboratory and Process Control (4) II. Russell**

Lecture—3 hours; laboratory—3 hours. Prerequisite: consent of instructors. Principles of micro- and mini-computer use in measurement and control of laboratory instrumentation and processing operations with both theoretical and practical aspects of computer interfacing.

**157. Food Process Design (2) III. McCarthy**

Lecture—2 hours. Prerequisite: course 110B. Integration of engineering and economic principles applied to food process design. Specific areas covered include sanitation considerations, product quality, pollution control, equipment selection and safety. Offered in even-numbered years.

**190. Senior Seminar (1) I. Reid, German**

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.

**192. Internship for Advanced Undergraduates (1-12) I, II, III. The Staff (Merson in charge)**

Laboratory—3-36 hours. Prerequisite: consent of instructor. Work experience on or off campus in the practical application of food science. (P/NP grading only.)

**198. Directed Group Study (1-5) I, II, III. The Staff (Merson in charge)**

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Merson in charge)**

(P/NP grading only.)

**Graduate Courses**

**201. Food Chemistry and Biochemistry (3) I. Tappel, Bernhard, Gruenwedel**

Lecture—3 hours. Prerequisite: Biochemistry 101B. Topics on enzymes, proteins, pigments, lipids, and vitamins. Biochemical principles and methods related to food composition, preservation, and processing. Research proposals and group problem solving

**202. Chemical and Physical Changes In Food (3)**

II. Reid, Haard

Lecture—3 hours. Prerequisite: Biochemistry 101B; 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.

**205. Industrial Microbiology (3) I. Ogrydziak**

Lecture—3 hours. Prerequisite: Biochemistry 101A-101B and Microbiology 2; Microbiology 130A-130B or Genetics 102 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. Offered in even-numbered years.

**207. Advanced Sensory-Instrumental Analyses (3) III. Pangborn, Noble (Viticulture and Enology)**

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. Offered in even-numbered years.

**210. Proteins: Functional Activities and Interactions (3) II. Richardson**

Lecture—3 hours. Prerequisite: Biochemistry 101B. 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) I. German**

Lecture—3 hours. Prerequisite: Biochemistry 101B, 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.

**235. Mycology of Food and Food Products (3) II. Miller**

Lecture—3 hours. Prerequisite: course 104 or consent of instructor. Morphology and physiology of fungi associated with food. Desirable activities of fungi: food fermentations, single-cell protein production, mushroom culture. Undesirable activities: pre-harvest and postharvest deterioration, food spoilage and preservation, toxin production.

**250. Chromatographic and Electrophoretic Methods (4) II. G. Smith, Bandman, German**

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 1A-1B-1C, 8A-8B, 107A-107B; Biochemistry 101A-101B or consent of instructor. Theory and practice of gas and liquid chromatography and electrophoresis for analytical and preparative applications. Choice and optimization of separation methods, detection systems and recovery of purified sample components.

**250L. Chromatographic and Electrophoretic Methods Laboratory (1) II. G. Smith, Bandman, German**

Laboratory—3 hours. Prerequisite: course 250 concurrently. Practice of gas and liquid chromatography and electrophoresis for analytical and preparative applications. Choice and optimization of separation methods, detection systems, and recovery of purified sample components.

**256. Computer Applications in Laboratory and Process Control (3) III. Russell**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 156 or the equivalent. Theory and practice of microcomputer interfacing to laboratory instrumentation for analytical and process control applications. Study of methods common to modern instrumentation and control systems including: A/D and D/A conversions, transducers, signal conditioning, and data transmission.

**290. Seminar (1) I, II Lewis**

Seminar—1 hour. (S/U grading only.)

**290C. Advanced Research Conference (1) I, II, III. The Staff (Merson in charge)**

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.)

**291. Advanced Food Science Seminar (1) III. Lewis**

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.)

**298. Group Study (1-5) I, II, III. The Staff (Merson in charge)**

**299. Research (1-12) I, II, III. The Staff (Merson in charge)**

Prerequisite: graduate standing. (S/U grading only.)

## Food Service Management

(College of Agricultural and Environmental Sciences)

**Faculty**

See under the Department of Nutrition.

### The Major Program and Graduate Study

Food Service Management is incorporated within the major in Dietetics. 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 regarding the Management specialization listed under the Unrestricted Electives of the Dietetics major.

**Related Courses.** See Food Science and Technology, and Nutrition.

### Courses in Food Service Management

Questions pertaining to the following courses should be directed to the instructor or to the Nutrition Department Advising Office, 1151 Meyer Hall (916-752-2512).

**Upper Division Courses**

**120. Principles of Quantity Food Production (3) III. Prophet**

Lecture—3 hours. Prerequisite: Food Science and Technology 100B and 101BL. Fundamental principles of food service management including quantity food preparation, institutional equipment, receiving and storage, service, menu planning, merchandising, and safety.

**120L. Quantity Food Production Laboratory (2) I, II. Prophet**

Laboratory—6 hours. Prerequisite: course 120. Laboratory experience in quantity food production and service.

**121. Institutional Food Purchasing and Sanitation (3) I. Schneeman**

Lecture—1 hour; discussion—2 hours. Prerequisite: Microbiology 2; course 120. Principles of quantity food purchasing and sanitation.

**122. Food Service Systems Management (3) II. Prophet**

Lecture—3 hours. Prerequisite: Agricultural Economics 112, courses 120, 120L, 121. Principles of quantity food production management: production schedules, portion control, financial management, layout and equipment planning, evaluation of alternative systems, and computer applications.

**123. Personnel Management (3) III. The Staff**

Lecture—3 hours. Prerequisite: a basic course in general psychology. Major personnel management functions; legal constraints and requirements; procedures in solving personnel problems faced by supervisors.

**192. Internship (1-12) I, II, III. The Staff**

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.)

**197T. Tutoring in Food Service Management (1-2)**

I, II, III. The Staff (Prophet in charge) 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.)

**198. Directed Group Study (1-5) I, II, III. The Staff (Prophet in charge)**

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Prophet in charge)**

## French

(College of Letters and Science)

Manfred Kusch, Ph.D., Chairperson of the Department

Department Office (French and Italian), 516 Sproul Hall (916-752-0830)

**Faculty**

Claude Abraham, Ph.D., Professor

Emily Apper, Ph.D., Associate Professor

Max Bach, Ph.D., Professor Emeritus

Marc E. Blanchard, Agrégé de Lettres, Professor

Edward M. Bloomberg, Ph.D., Associate Professor

Ruby Cohn, Ph.D., Professor (*Comparative Literature, Dramatic Art*)

Michele Hannoosh, Ph.D., Assistant Professor (*French, Comparative Literature*)

Gerald Herman, Ph.D., Senior Lecturer

Margo R. Kaufman, M.A., Senior Lecturer

Manfred Kusch, Ph.D., Associate Professor (*French, Comparative Literature*)

Marshall Lindsay, Ph.D., Professor Emeritus

Maria I. Manea-Manoliu, Ph.D., Professor

Michèle Praeger, Ph.D., Assistant Professor

Ruth B. York, Ph.D., Senior Lecturer Emerita

## The Major Program

The major program is designed to assure proficiency in all four of the language skills—speaking, understanding, reading, and writing—and to acquaint students with the intellectual and cultural contributions of the French-speaking world through the study of its literature, traditions, and institutions.

A major in French is excellent preparation for those contemplating careers in government, business, teaching, or the other professions. As the major program provides not only training in a foreign language, but also cultivates critical and analytical thinking, clear expression, effective writing, an historical perspective, and an appreciation of cultural difference, it is not surprising that graduates of the department have achieved success in the most diverse careers. Foreign language teachers, a cardiologist, a veterinarian, a naval commander at the Pentagon, a professor of Political Science, lawyers, sales representatives, journalists, an anesthesiologist, a law professor, translators, a senior applications programmer, travel agents, independent business owners, a senior museum preparator, 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 and represent only a small fraction of the career choices documented in a recent survey of department graduates.

The department is strongly committed to undergraduate education. It 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. The program places great emphasis on clear and effective writing in all of its courses,

in the firm belief that good writing needs to be practiced throughout a student's career and in the context of genuine academic courses. While the department feels strongly that the study of the language and the rich tradition of French literature should form the core of the major program, it also recognizes the increasing importance of more "practical" applications such as business French and offers access to contemporary French politics and civilization through the study of French newspapers and magazines and the viewing of French television news programs. The department sponsors an active French Club and a chapter of Pi Delta Phi, the National French Honor Society. Each year, a substantial number of students with a good preparation in French participate in the university's very popular Education Abroad Program which maintains centers at seven French universities.

### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b>	<b>19-36</b>
French 1, 2, 3, 5 (or the equivalent).....	0-17
French 21, 22, 23 .....	15
Linguistics 1 .....	4
French 45 recommended.	
<b>Depth Subject Matter</b>	<b>44</b>
French 100 .....	4
French 101, 102, 103 .....	12
French 104 .....	4
Two additional upper division French literature courses .....	8
Elective courses in French literature, language, or civilization to be chosen in consultation with undergraduate adviser .....	16
<b>Total Units for the Major</b>	<b>63-80</b>

**Recommended**

French 101, 102, 103, 104, 107, 135, and 160 plus other upper division courses for a total of 45 units for students interested in obtaining a "single subject" teaching credential in California.

**Major Adviser.** G. Herman.

### Minor Program Requirements:

	UNITS
<b>French</b>	<b>24</b>
French 100 .....	4
French 101, 102, 103 .....	12
Two elective courses in French language, literature, or civilization to be chosen in consultation with undergraduate adviser .....	8

**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.

**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 at least six units of French 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 the junior year (135 units), have attained a cumulative grade-point average of 3.5 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.

**Graduate Study.** The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in French.

The Master of Arts degree program is available to students who complete an undergraduate major in French or the equivalent. Students, in special circumstances, may make up work deficient to the major requirements and then continue with an advanced degree. Candidates will be recommended

for admission to graduate studies in French provided the requirements of the Graduate Division and the Department of French and Italian have been met. Basic requirements for the M.A. are a minimum residence of three quarters, 36 quarter units, and a passing score in the comprehensive examination, or 30 quarter units and the acceptance of a written thesis.

The doctoral program stresses individualized study suited to the student's interest. Particularly encouraged are programs that involve the use of resources in allied departments and programs such as Dramatic Art, Comparative Literature, English, etc. The Department regularly sponsors an exchange program with French institutions of learning. Basic requirements include demonstration of linguistic competence, passing of a qualifying examination, completion of an acceptable dissertation, and one year of teaching in the department as a Teaching Assistant.

**Graduate Advisers.** Maria I. Manea-Manoliu (M.A. degree); M. E. Blanchard (Ph.D. degree).

**Teaching Credential Subject Representative.** Y. Wagnildi. See also under the Teacher Education Program.

## Courses in French

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 Courses

**1. Elementary French (5) I, II, III. The Staff (Chairperson in charge)**  
Discussion—5 hours; laboratory—1 hour. Students who have successfully completed (C- or better) 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.

**1G. French for Graduate Students (5) III. The Staff (Chairperson in charge)**  
Lecture-discussion—5 hours. A course designed to prepare students for the graduate reading examination in French. (P/NP grading only.)

**2. Elementary French (5) I, II, III. The Staff**  
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1.

**3. Elementary French (5) I, II, III. The Staff**  
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of course 2.

**5. Introduction to French Phonetics (2) I, III. The Staff**  
Lecture-laboratory—3 hours. Prerequisite: course 3; course 5 is normally taken concurrently with course 21. Practically oriented presentation of French sounds and intonational patterns. Laboratory drills with emphasis on phonetic features specific to contemporary spoken French.

**8. French Conversation (2) I, II, III. The Staff**  
Discussion—2 hours; laboratory—1 hour. Prerequisite: course 3. Practice in speaking French; weekly quizzes and an oral and written final examination. Not open to native speakers.

**21. Intermediate French (5) I, II, III. The Staff**  
Lecture-discussion—5 hours. Prerequisite: course 3. Grammar, oral practice, composition. Initiation to French institutions; reading and discussion of short literary texts.

**22. Intermediate French (5) I, II, III. The Staff**  
Lecture-discussion—5 hours. Prerequisite: course 21. Continuation of course 21. Grammar, oral practice, composition. Contemporary French culture; reading and discussion of a play.

**23. Intermediate French (5) I, II, III. The Staff**  
Lecture-discussion—5 hours. Prerequisite: course 22. Continuation of course 22. Grammar, oral practice, composition. Current topics in French politics

and culture; reading and discussion of a novel.

**25. Introduction to French Literature In Translation (3) II. The Staff**

Discussion—3 hours. Introductory study of outstanding works of French drama and prose. Topics include major authors, genres, literary periods/movements. Study of literary techniques, structure, and meaning to foster better understanding of creative processes in French cultural context. Intended for the nonmajor. General Education credit: Civilization and Culture/Introductory.

**35. Explication and Dissertation (2) III. The Staff (Chairperson in charge)**

Lecture-discussion—2 hours. Prerequisite: course 22. Theory and practice of French *explication de texte* and *dissertation*. Especially recommended for those students planning to study abroad in French universities.

**38. Intermediate French Conversation (2) I, II, III. The Staff**

Discussion—2 hours. Prerequisite: course 22. Practice in speaking French; weekly quizzes and an oral and written final examination. Not open to native speakers or to upper division students.

**45. Introduction to French Literature (4) I, II, III. The Staff**

Lecture—3 hours; term paper. Prerequisite: course 22. Selected themes in French literature.

**98. Directed Group Study (1-5) I, II, III. The Staff**

Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)**

(P/NP grading only.)

**Upper Division Courses**

**100. Composition In French (4) I, II, III. The Staff**

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.

**101. Introduction to French Poetry (4) II, III. Abraham, Blanchard**

Lecture—3 hours; short papers. 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.

**102. Introduction to French Drama (4) I, III. Abraham**

Lecture—3 hours; short papers. 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.

**103. Introduction to French Prose (4) I, II. The Staff**

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.

**104. Translation (4) I, II. The Staff**

Lecture—3 hours; short translations. Prerequisite: course 100 or consent of instructor. Practice in translation into French using a variety of texts illustrating different problems and styles.

**106. French In Business and the Professions (4) I. Herman**

Lecture—1 hour; discussion—2 hours; frequent written assignments. 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.

**107. Contemporary France (4) III. Praeger**

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Introduction to aspects of French culture and institutions of the contemporary period such as art, architecture, music, literature. Provides a background in French contemporary history, sociology, and institutions.

**108. Advanced French Conversation (2) I, III. The Staff**

Discussion—3 hours. Prerequisite: course 23 or consent of instructor. Advanced conversational practice stressing accurate pronunciation and spoken language fluency. Not open to native speakers. May not be counted toward French major. May be repeated once for credit.

**110. Stylistics and Creative Composition (4) II. Herman**

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.

**112. Masterpieces of French Drama in Translation (3) II. The Staff**

Discussion—3 hours. Prerequisite: course 25 or consent of instructor. Plays in translation representing the main types of French drama with emphasis on dramatic structure and techniques. Consideration of this genre within French social and cultural content. Intended for the nonmajor. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: French 25.

**113. Masterpieces of French Novel in Translation (3) III. Blanchard**

Discussion—3 hours. Prerequisite: course 25 or consent of instructor. Novels in translation representing works from the seventeenth century to the present. Study of broad generic, theoretical, and historical contexts in France. Analysis of structure and techniques of the genre. Intended for the nonmajor. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: French 25.

**114. French Philosophical Literature In Translation (3) III. Blanchard**

Discussion—3 hours. Prerequisite: course 25 or consent of instructor. French philosophical literature, with works analyzed within broad philosophic, moral, and historical contexts. Focus on such topics as stoicism, classicism, libertinism, naturalism, existentialism, absurdism. Literary techniques and styles analyzed. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: French 25.

**\*115. Medieval Literature: Epic and Romance (4) I. Herman**

Lecture—3 hours; term paper. Prerequisite: course 100 and 101; or 103; or consent of instructor. *La Chanson de Roland*, *Tristan et Iseut*, and selected works of Chrétien de Troyes. Texts to be read in modern French.

**116. Literature of the Sixteenth Century (4) III. The Staff**

Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. Rabelais and Montaigne. Critical study of the works in relationship to the period.

**\*117A. Classical Tragedy (4) III. Abraham**

Lecture—3 hours; term paper. Prerequisite: courses 100 and 102 or consent of instructor. Study of plays of Racine and Corneille.

**117B. Classical Comedy (4) I. Abraham**

Lecture—3 hours; term paper. Prerequisite: courses 100 and 102 or consent of instructor. Study of works of Molière and other writers of comedy of the seventeenth century.

**\*117C. The Moralistes (4) II. Bloomberg**

Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. Study of works of such *moralistes* as Pascal, La Rochefoucauld, La Bruyère, Descartes, the Chevalier de Méré, and Boileau.

**118A. Les Philosophes (4) II. The Staff**

Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. Readings from Montesquieu, Voltaire, Diderot, Rousseau, and the Encyclopédie.

**\*118B. The Novel in the Eighteenth Century (4) II. Kusch**

Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. Novels of Lesage, Prévost, Diderot, Rousseau, Laclos, Sade.

**119A. The Nineteenth Century (4) II. Hannoosh**

Lecture—3 hours; term paper. Prerequisite: courses 100 and 102 or 103 or consent of instructor. Romanticism in the drama and novel. Plays of Hugo and Musset, novels of Stendhal, Nerval, Flaubert, Mérimée, and Chateaubriand.

**119B. The Nineteenth Century (4) III. Hannoosh**

Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. Realism and Naturalism: Balzac, Flaubert, Maupassant, Zola.

**\*119C. Nineteenth-Century Poetry (4) II. Hannoosh**

Lecture—3 hours; term paper. Prerequisite: courses 100 and 101 or consent of instructor. Poetry from the Pre-Romantics to Baudelaire.

**120A. Twentieth-Century Drama (4) I. The Staff**

Lecture—3 hours; term paper. Prerequisite: courses 100 and 102 or consent of instructor. Representative plays from Jarry to Giraudoux.

**120B. Twentieth-Century Drama (4) III. The Staff**

Lecture—3 hours; term paper. Prerequisite: courses 100 and 102 or consent of instructor. Representative plays from Anouilh to Arrabal.

**\*121. Twentieth-Century Novel (4) I. Blanchard**

Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. *Soties*, *récits*, and novel of André Gide and novels of Marcel Proust.

**\*122. Twentieth-Century Novel (4) I. Praeger**

Lecture—3 hours; term paper. Prerequisite: courses 100 and 103 or consent of instructor. From Malraux to the Nouveau Roman, including such novelists as Sartre, Camus, de Beauvoir, Bernanos, Mauriac, Céline, Robbe-Grillet, Simon, Butor.

**\*123. Twentieth-Century Poetry (4) II. The Staff**

Lecture—3 hours; term paper. Prerequisite: courses 100 and 101 or consent of instructor. Selected poetic texts from Apollinaire to the present, including such poets as Saint-John Perse, Breton, Aragon, Reverdy, Eluard, Desnos, Ponge, Char, Michaux, Bonnefoy.

**\*135. Advanced Composition (4) III. Praeger**

Lecture—3 hours; short papers. Prerequisite: course 100 or consent of instructor. Practice in advanced composition, using the French *dissertation* as model, with occasional *explications de texte*.

**138. Advanced Literary Translation (4) II. Bloomberg**

Lecture—3 hours; term paper. Prerequisite: courses 100 and 104 or consent of instructor. Morphological, syntactical, and stylistic aspects of English-French translation.

**\*140. Study of a Major Writer (4) II. The Staff (Chairperson in charge)**

Lecture—3 hours; term paper. Prerequisite: course 100 and course 101, 102, or 103 as appropriate to selected topic, or consent of instructor. Concentrated study of works of a single author. May be repeated once for credit as author-subject changes.

**\*141. Selected Topics In French Literature (4) II. The Staff (Chairperson in charge)**

Lecture—3 hours; term paper or short papers. Prerequisite: courses 100 and 101 or 102 or 103 as appropriate to the selected topic 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, etc. May be repeated once for credit in a different subject area.

**\*150. Masterpieces of French Literature in Translation (3) III. Blanchard**

Lecture—3 hours; short papers. Prerequisite: course 25 and either course 112, 113, or 114, or consent of instructor. Selected masterpieces of French literature. Works to be analyzed in broad generic, philosophical, and historical contexts. Emphasis also on literary techniques.

**\*159. French Phonetics (3) I. Manea-Manoliu**

Lecture—3 hours. Prerequisite: course 5. Contrastive analysis of the sounds of English and French; practical exercises in the pronunciation of modern French, with special emphasis on the problems of English-speaking students.

**160. Structure of the French Language (4) II.**

Manea-Manoliu

Lecture—3 hours; short papers. Prerequisite: course 23; Linguistics 1. Analysis of content and functions of the main grammatical categories of French in framework of recent structural approaches.

**161. Modern French Syntax (4) III. Manea-Manoliu**

Lecture—3 hours; short papers. Prerequisite: course 160. Presentation of basic concepts of contemporary approaches to French syntax. Consideration of new explanations of so-called "irregular" phenomena in current language models.

**\*162. History of French Language (4) II. Manea-Manoliu**

Lecture—3 hours; term paper. Prerequisite: course 160. 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.

**162. Internship (1-12) I, II, III. The Staff**

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 (1-5) I, II, III. The Staff (Chairperson in charge)**

Independent study—1-5 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.)

**197T. Tutoring in French (1-4) I, II, III. The Staff**

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 by the sponsoring instructor. (P/NP grading only.)

**\*197TC. Tutoring in the Community (2-4) I, II, III.**

Kaufman

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) I, II, III. The Staff**

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)**

(P/NP grading only.)

**Graduate Courses****200. Literary Analysis (2) I. Blanchard**

Proseminar—1 1/2 hours; short papers. Prerequisite: graduate standing. Required of all graduate students in French, this proseminar is designed to acquaint students with basic principles of applied literary theory.

**201. History of French: Phonology and Morphosyntax (4) III. Manea-Manoliu**

Seminar—3 hours; term paper. Prerequisite: courses 159, 160, 250A, or consent of instructor. Presentation of the main changes in the phonematic and grammatical structures of French, from Latin to contemporary spoken aspects.

**\*202A. Medieval French Literature: The Epic Tradition (4) II. Herman**

Seminar—3 hours. Prerequisite: course 201 recommended. Literary and stylistic study of selected *chansons de geste*. Readings in Old French. May be

repeated for credit with consent of instructor when different topic studied.

**\*202B. Medieval French Literature: The Romance Tradition (4) I. Herman**

Seminar—3 hours. Prerequisite: course 201 recommended. Chrétien de Troyes and the doctrine of courtly love. Literary and stylistic study of Chrétien's major works. Readings in Old French. May be repeated for credit with consent of instructor when different topic is studied.

**\*205A. Sixteenth-Century Literature: The Humanists (4) I. The Staff**

Seminar—3 hours. 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.

**206A. Seventeenth-Century Literature: Theater (4) II. Abraham**

Seminar—3 hours. 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.

**\*206B. Seventeenth-Century Literature: Prose (4) I. The Staff**

Seminar—3 hours; term paper and/or exposé. 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.

**\*206C. Seventeenth-Century Literature: Poetry (4) III. Abraham**

Seminar—3 hours; term paper and/or exposé. Studies of the works of one or more poets of the period. May be repeated for credit with consent of instructor.

**\*207A. Eighteenth-Century Literature: Philosophes (4) II. Kusch**

Seminar—3 hours; term paper and/or exposé. 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.

**207B. Eighteenth-Century Literature: Novel (4) III. The Staff**

Seminar—3 hours. 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.

**208A. Nineteenth-Century Literature: Fiction (4) I. Hannoosh**

Seminar—3 hours. 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.

**\*208B. Nineteenth-Century Literature: Theater (4) II. The Staff**

Seminar—3 hours. Study of the works of one or more dramatists of the period. May be repeated for credit with consent of instructor when different topics are studied.

**208C. Nineteenth-Century Literature: Poetry (4) III. Blanchard**

Seminar—3 hours. 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.

**209A. Twentieth-Century: Prose (4) II. The Staff**

Seminar—3 hours; term paper and/or exposé. Study of the works of one or several writers of the period.

**\*209B. Twentieth-Century: Theater (4) II. Cohn**

Seminar—3 hours; term paper and/or exposé. Study of the works of one or several dramatists of the period. May be repeated for credit with consent of instructor.

**\*209C. Twentieth-Century: Poetry (4) III. The Staff**

Seminar—3 hours; term paper and/or exposé. Study of the works of one or several poets of the period. May be repeated for credit with consent of instructor.

**210. Studies in Narrative Fiction (4) I. Praeger**

Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

**211. Studies in Criticism (4) II. Blanchard**

Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

**\*212. Studies in the Theater (4) I. The Staff**

Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

**213. Studies in Poetry (4) II. The Staff**

Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

**\*214. Study of a Literary Movement (4) III. The Staff**

Seminar—3 hours. May be repeated for credit with consent of instructor when different topic is studied.

**238. Advanced Literary Translation (4) III.**

Bloomberg

Seminar—3 hours; significant amounts of translation of texts. Designed to acquaint students with the basic principles of applied translation theory. Translation of texts chosen for their theoretical interest. Open to native French speakers only with consent of instructor.

**\*250A. French Linguistics: Morphematics (4) I.**

Manea-Manoliu

Seminar—4 hours. Prerequisite: courses 159, 160, or consent of instructor. Theoretical approach to French grammar, with emphasis on morphematics, i.e., a semantic analysis of grammatical categories, as well as of their paradigmatic and syntactic relations.

**\*250B. French Linguistics: Transformational Syntax (4) I. Manea-Manoliu**

Seminar—4 hours. Prerequisite: course 250A or consent of instructor. Presentation of French syntax exemplified by a core of transformational rules (such as subjectivization, passivization, relativization, etc.) focusing on the most recent developments in the field (i.e., case grammars, generative semantics, trace theory, etc.).

**\*251. Trends in French Contemporary Linguistics (4) I. Manea-Manoliu**

Seminar—3 hours; term paper. Prerequisite: course 250A or 250B or consent of instructor. Issues in contemporary French linguistic thought and their relationship to the development of theoretical linguistics. Topics such as pragmatics, semantics, symbolic logic, speech acts, etc. Intended for students in French linguistics or those interested in applying linguistic models to literature.

**261. Current Issues in Modern French Syntax (4) II. Manea-Manoliu**

Seminar—3 hours; term paper. Presentation of contemporary approaches to French syntax. Explanations of various less regular phenomena, with reference to on-going changes in modern spoken French.

**290. Research Methods (2) I. Abraham**

Proseminar—2 hours. Prerequisite: graduate student standing. Required of all graduate students in French. Introduces students to tools of research and to the various critical methods. (S/U grading only.)

**297. Individual Study (1-5) I, II, III. The Staff**

(S/U grading only.)

**298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

Seminar—1-5 hours. May be repeated for credit with consent of instructor.

**299. Research (1-12) I, II, III. The Staff**

(S/U grading only.)

**299D. Dissertation Research (1-12) I, II, III. The Staff**

(S/U grading only.)

**Professional Courses****300. Teaching of a Modern Foreign Language (3) III. Kaufman**

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) I.**

Wagnild

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.)

**390B. The Teaching of French in College (2) II.**

Wagnild

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.)

**390C. The Teaching of French in College (2) III.**

Wagnild

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.)

## Freshman Seminar Program

Evelyn M. Silvia, Ph.D., Program Director

Program Office, 17 Wellman (Teaching Resources Center) (916-752-6050)

**Committee in Charge**

Stephanie Beardsley, Ph.D. (Residence Life)  
 Erin Braddock (Student Representative, ASUCD—Academic Affairs)  
 Alan Jackman, Ph.D. (President's Chair in Undergraduate Education)  
 Robert Powell, Ph.D. (College of Engineering)  
 David Robertson, Ph.D. (Committee on Educational Policy)  
 Harry Walker, Ph.D. (College of Agricultural and Environmental Sciences)  
 Carolyn Wall, Ph.D. (College of Letters and Science)  
 Dan Wick, Ph.D. (Teaching Resources Center)

**Course in Freshman Seminar**

(Questions pertaining to the following course should be directed to the instructor or to the Teaching Resources Center.)

**1. Freshman Seminar (2) I, II, III.**, The Staff Seminar—20 hours total (8 weeks). Prerequisite: open only to students who have completed less than 44 quarter units. Investigation of a special topic through shared readings, discussions, written assignments, and special activities (such as field-work, site visits, laboratory work, etc.). Emphasis upon student participation in learning.

## Genetics

(College of Agricultural and Environmental Sciences)

John A. Kiger, Jr., Ph.D., Chairperson of the Department  
Department Office, 357 Briggs Hall (916-752-0200)**Faculty**

James B. Boyd, Ph.D., Professor  
 Kenneth Burts, Ph.D., Assistant Professor  
 Gordon J. Edlin, Ph.D., Professor  
 John H. Gillespie, Ph.D., Professor  
 Leslie D. Gotlieb, Ph.D., Professor  
 Melvin M. Green, Ph.D., Professor Emeritus  
 John A. Kiger, Jr., Ph.D., Professor  
 Charles H. Langley, Ph.D., Professor

Timothy Prout, Ph.D., Professor Emeritus (*Genetics, Entomology*)

<sup>1</sup>Raymond L. Rodriguez, Ph.D., Professor  
 Che-Kun J. Shen, Ph.D., Professor  
 S. Richard Snow, Ph.D., Professor Emeritus  
 G. Ledyard Stebbins, Ph.D., Professor Emeritus  
<sup>1</sup>Michael Turelli, Ph.D., Professor

to be represented, such as agricultural science, biochemistry, cell biology, statistics, physiology, or systematics. No more than 4 units of 192, 198, or 199 units can be used in this category.

**Unrestricted Electives** ..... 15-36**Total Units for the Degree** ..... 180**Major Adviser.** G. J. Edlin.

**Graduate Study.** The Graduate Group in Genetics offers study and research leading to the M.S. and Ph.D. degrees in Genetics.

**Related Courses.** See Agronomy 207, 221, 222, 223, 224, 225, Animal Genetics 107, 108, 109, 204, 206, 207, 208, Anthropology 151, 152, 153, 157, 157L, Biochemistry and Biophysics 153, 201C, Biological Chemistry 217, Genetics Graduate Group, Plant Pathology 215, Plant Science 103, 113, 122, Psychology 251, Vegetable Crops 220, 220L, 221, 221L, Zoology 148, 149.

## Courses in Genetics

**Lower Division Courses****10. Heredity and Evolution (4) I, II.** Edlin

Lecture—3 hours; discussion—1 hour. Course intended for liberal arts students. Examines principles and recent developments in genetics and evolution in context of their social implications. General Education credit: Nature and Environment/Introductory.

**99. Special Study for Undergraduates (1-5) I, II, III.**

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses****100. Principles of Genetics (4) I, II, III, Summer.** The Staff

Lecture—4 hours. Prerequisite: Biological Sciences 1B or Microbiology 2. Introduction to genetics, emphasizing DNA structure and function, gene regulation including transmission genetics, cytogenetics, and evolutionary genetics.

**100L. Principles of Genetics Laboratory (2) I, II.**

The Staff

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 100; Microbiology 102L or Microbiology 3. Laboratory work in basic genetics including gene mapping and isolation of mutants.

**102A. Molecular Genetics (3) II.** Edlin

Lecture—3 hours. Prerequisite: course 100; Biochemistry 101B. Prokaryotic molecular genetics including DNA structure and replication, restriction analysis, sequencing, transcription, translation and gene regulation.

**102B. Molecular Genetics (3) III.** Shen

Lecture—3 hours. Prerequisite: course 102A. Continuation of course 102A, emphasizing fundamental discoveries in eukaryotic molecular genetics, transposable elements, and mechanisms of recombination.

**102L. Advanced Molecular Genetics Laboratory (4) III.** Burts

Lecture—1 hour; laboratory—9 hours. Prerequisite: courses 100L, 102A; Biochemistry 101L; consent of instructor; Microbiology 130L recommended. Genetic analysis of gene structure and function using recombinant DNA technology. Experiments involve the isolation of prokaryotic genes to demonstrate the genetic principles of complementation, transformation, and gene expression. Limited enrollment.

**103. Organic Evolution (3) III.** Gillespie

Lecture—3 hours. Prerequisite: course 100. Evolution in higher organisms including genetic structure in populations, speciation, macroevolution, and history of life.

**104. Developmental Genetics (3) II.** Kiger

Lecture—3 hours. Prerequisite: course 100; Biochemistry 101A and Zoology 100 recommended. Current aspects of developmental genetics. Historical background and current genetic approaches to the study of development of higher animals.

<sup>1</sup>Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the Social Sciences and Humanities requirements.

**105. Population Genetics (4) I.** Gillespie

Lecture—4 hours. Prerequisite: course 100; a course in statistics and Mathematics 16B. Population genetics including the effects of natural selection, migration, mutation and genetic drift.

**\*106. Evolutionary Quantitative Genetics (4) II.**

Turelli

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100, Mathematics 16C, and Statistics 102. Experimental and theoretical analysis of polygenic traits. Topics include classical experiments and methods of analysis as well as modern theoretical treatments with emphasis on applications to microevolution and macroevolution. Offered in even-numbered years.

**107. Human Genetics (3) I.** Sanders

Lecture—3 hours. Prerequisite: course 100 or the equivalent. Human molecular genetic variation, molecular basis of metabolic disorders, chromosome aberrations and consequences, diseases associated with the immune system, and statistical techniques for estimating genetic and environmental effects.

**190C. Introduction to Genetics Research (1) I, II, III, summer.** The Staff (Chairperson in charge.)

Discussion—1 hour. Prerequisite: upper division standing in Genetics or related biological sciences; consent of instructor. Discussion and critique of current genetics research by faculty, graduate, and undergraduate students. May be repeated for credit. (P/NP grading only.)

**192. Internship (1-12) I, II, III.** The Staff

Laboratory—3-36 hours. Prerequisite: course 100 and consent of instructor. Technical or practical experience on or off campus, and supervised by member of Genetics faculty. (P/NP grading only.)

**197T. Tutoring in Genetics (1-5) I, II, III.** The Staff (Chairperson in charge)

Tutoring—1-5 hours. Prerequisite: upper division standing and consent of instructor. Conducting of discussion groups affiliated with one of the department's regular courses. (P/NP grading only.)

**198. Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor based on adequate preparation of the student in allied fields. (P/NP grading only.)

**Graduate Courses****\*202. Plasmids, Recombinant DNA, and Genetic Engineering (3) II.** Rodriguez

Lecture—3 hours. Prerequisite: course 102A or Microbiology 130A-130B, or consent of instructor. Presentation of recent experiments in recombinant DNA technology. Description of biochemical and genetic properties of bacterial plasmids. (S/U grading only.) Offered in odd-numbered years.

**203. Advanced Evolution (3) III.** Gottlieb

Lecture—1 hour; discussion—2 hours. Prerequisite: graduate status. Adaptation and speciation, and biochemical and morphological evolution in plants and animals with emphasis on the appropriateness of different methods of analysis. Offered in odd-numbered years.

**205. Theoretical Population Genetics (4) II.** Gillespie, Langley

Lecture—4 hours. Prerequisite: course 105; Mathematics 22A, and Statistics 130A or 131A, and consent of instructor; Mathematics 22B recommended. Mathematical theory of population genetics with emphasis on the assumptions underlying the standard models and the mathematical techniques used to derive conclusions. (S/U grading only.) Offered in odd-numbered years.

**209. Molecular Evolution (3) III.** Gillespie, Langley, Turelli

Lecture—3 hours. Prerequisite: Biochemistry 101B; course 103 recommended. Evolution from the molecular standpoint, including the evolution of genome structure and the organization of single genes and

gene clusters, evolution of enzymes and metabolic pathways, molecular clocks, transposons and other movable genetic elements, and molecular polymorphisms. Offered in even-numbered years. (S/U grading only.)

**290C. Research Conference in Genetics (1) I, II, III.**

The Staff (Chairperson in charge)

Discussion—1 hour. Prerequisite: graduate standing in Genetics; consent of instructor. Presentations and critical discussions of current research in genetics. Intended primarily for graduate students. May be repeated for credit. (S/U grading only.)

**298. Group Study (1-5) I, II, III.** The Staff

Prerequisite: consent of instructor. (S/U grading only.)

**299. Research (1-12) I, II, III.** The Staff (S/U grading only.)**Professional Course****300. Methods in Teaching Genetics (1) I, II, III.** The Staff (Chairperson in charge)

Lecture-discussion—1 hour. Prerequisite: graduate standing in Genetics and consent of instructor. Experience in methods and problems of teaching genetics, including analysis of texts and other materials, teaching techniques, preparing for and conducting discussion and laboratory sections, preparing examinations. May be repeated for credit. (S/U grading only.)

## Genetics (A Graduate Group)

Calvin O. Qualset, Ph.D., Chairperson of the Group  
Group Office, 357 Briggs Hall (916-752-9091)

**Graduate Study.** The Graduate Group in Genetics offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding the programs, address the chairperson of the group.

**Graduate Advisers.** Consult Genetics Graduate Group Office.

### Courses in Genetics

**Graduate Courses****220. Advanced Genetics Laboratory (5) I, II, III.**

The Staff

Laboratory—15 hours. Prerequisites: Genetics 100 or the equivalent; enrollment in Genetics Graduate Group. Student is assigned to genetics research laboratory. Individual research problems with emphasis on methodological/procedural experience and experimental design. May be repeated twice for credit, in different laboratories. (S/U grading only.)

**221. Transmission Genetics (3) I.** Gepts

Lecture—3 hours. Prerequisite: Genetics 100, introductory statistics, and calculus. Study of segregation, linkage, and mapping and the modification of Mendel's original genetic model.

**222. Cytogenetics (3) II.** Dvorak, Murray

Lecture—3 hours. Prerequisite: course 221. Study of cytogenetics including meiosis, recombination, chromosomes, haploidy, aneuploidy, trisomics, monosomics, autopolyploids, and intra- and interspecific manipulation.

**223. Molecular Genetics (3) III.** Burts, Williamson

Lecture—3 hours. Prerequisite: course 221 or consent of instructor. Current topics in molecular genetics at a graduate level, with emphasis on the relationship between classical genetic studies and current molecular research, as well as on the molecular techniques used to develop the basic concepts of molecular genetics.

**224. Quantitative and Population Genetics (3) I.**

Touchberry

Lecture—3 hours. Prerequisite: course 221 or consent of instructor. The basic concepts of quantitative

and population genetics including gene and genotypic frequencies, multiple factor hypothesis, phenotypic and genotypic values, heritability, selection, genetic variation and evolution in populations, and experimental methodologies.

**291. Seminar in History of Genetics (2) III.** Griesemer (Philosophy)

Seminar—2 hours. Prerequisite: Genetics 100. The development of modern genetic theories beginning with Mendel.

**292. Seminar in Molecular Genetics (1-3) I.** Tyler

Seminar—1-3 hours. Prerequisite: course 221. Topics of current interest related to the structure, modification, and expression of genes.

**293. Seminar in Cytogenetics (1-3) III.** Quiros

Seminar—1-3 hours. Prerequisite: course 221. Topics related to the deletion, duplication, and rearrangement of chromosome regions.

**294. Seminar in Quantitative Genetics (1-3) III.**

Teuber

Seminar—1-3 hours. Prerequisite: course 221. Topics of current interest related to the inheritance of continuous characters.

**295. Seminar in Developmental Genetics (1-3) III.**

Kiger

Seminar—1-3 hours. Prerequisite: course 221. Topics in the area of cell-specific control of genes in development.

**296. Seminar in Population, Evolutionary, and Ecological Genetics (1-3) I.** Jain

Seminar—1-3 hours. Prerequisite: course 221. Topics related to the analysis and prediction of genetic changes in populations.

**298. Group Study (1-5) I, II, III.** Members of the Group (Chairperson in charge)

Prerequisite: consent of instructor. Group Study of selected topics in Genetics. (S/U grading only.)

**299. Research (1-12) I, II, III.** Members of the Group (Chairperson in charge)

(S/U grading only.)

## Geography

(College of Letters and Science)

Jack D. Ives, Ph.D., Chairperson of the Department  
Department Office, 280 Kerr Hall (916-752-0790)

**Faculty**

Conrad J. Bahre, Ph.D., Associate Professor

Mary B. Cunha, M.A., Lecturer

Robin E. Datel, Ph.D., Lecturer

Dennis J. Dingemans, Ph.D., Associate Professor

Deborah L. Elliott-Fisk, Ph.D., Associate Professor

Howard F. Gregor, Ph.D., Professor Emeritus

Louis E. Grivetti, Ph.D., Professor (Geography, Nutrition)

Jack D. Ives, Ph.D., Professor

Stephen C. Jett, Ph.D., Professor

Deryck O. Lodrick, Ph.D., Lecturer

Marilyn L. Shelton, Ph.D., Associate Professor

Frederick J. Simoons, Ph.D., Professor Emeritus

Kenneth Thompson, Ph.D., Professor Emeritus

### The Major Program

Geography is a multifaceted discipline defined by its concern with place. Since antiquity, geography has embraced four traditions: spatial; area studies; Mankind; and earth sciences. Geographers strive to answer spatial questions regarding the earth's surface and adjacent atmosphere and to describe and explain the character of regions; to ascertain the ways in which humans, historical and contemporary, have utilized and shaped the earth's surface; and to understand the physical, biotic, and human systems of our global environment and their mutual interactions.

## 256 Geography

The curriculum of the major permits students to pursue a program of study compatible with individual needs, interests, and objectives. In the Bachelor of Arts program, the student may choose a general program, or specialize in cultural/historical geography, economic/urban geography, physical geography (including biogeography), or regional planning and analysis. The Bachelor of Science program is for students with strong science backgrounds who are interested in some aspect of physical geography. Both degree programs include opportunities for developing skills in cartography, field techniques, quantitative methods, and remote sensing, and are planned in consultation with the major adviser. Geography is an essential component of a liberal education, and the major is intended to provide an opportunity for broad intellectual enrichment. Students trained in undergraduate geography have advantages in pursuing careers in international trade, travel, and politics; environment- and resource oriented government employment; cartography and remote sensing; primary and secondary education; and urban and regional planning.

### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b>	<b>10</b>
Geography 1, 2, and 5	10
<b>Depth Subject Matter</b>	<b>35-44</b>
Geography 105 or 106, 151, and one UCD regional course from Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, 127	11-12
Choose one emphasis from the following five:	
<b>Emphasis I (General)</b>	<b>24-28</b>
One course from each of the following three groups:	
a. Geography 170 and 171	
b. Geography 141 and 155	
c. Geography 108 and 115	
Four additional upper division geography courses.	
<b>Emphasis II (Cultural/Historical)</b>	<b>28</b>
Geography 170, 171, one course from 108, 115, 141, 155.	
Four additional courses from Geography 110, 143, 172, 173, 175.	
<b>Emphasis III (Economic/Urban)</b>	<b>28</b>
Geography 110, 141, 155, one course from 108, 115, 170, 171.	
Three additional courses from Geography 104, 142, 143, 156, 160, 161, 162	
<b>Emphasis IV (Physical)</b>	<b>31-32</b>
Geography 3, 108, 110, 115, 162, 173, one course from 141, 155, 170, 171.	
One additional course from Geography 102, 112, 116, 117, 161.	
<b>Emphasis V (Regional Planning and Analysis)</b>	<b>26-32</b>
Geography 155 or 156, 110 one additional course from 121-127, and one course from 142, 160, 161, 162, 170, 173	
Environmental Biology and Management 110 and 134, or Environmental Studies 171; Political Science 107 or Environmental Studies 161, plus one course from Economics 115A, Agricultural Economics 148, or Geology 134.	
<b>Total Units for the Major</b>	<b>45-54</b>

**Recommended:** Geography 4

### B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b>	<b>57-64</b>
Geography 1, 2, 3, and 5	16
Statistics 13 or the equivalent	4
Mathematics 16A, 16B, and 16C; or Mathematics 21A, 21B, and 21C	9-12
Computer Science Engineering 10 or 30	3-4

Chemistry 1A, 1B, 1C or 4A, 4B, 4C	15
Biological Sciences 1	5
Zoology 2-2L or Botany 2 or Geology 60-60L or Physics 6A and 6B	5-8
<b>Depth Subject Matter</b>	<b>43-45</b>
Geography 105, 106, 108, 115, 151	20
Two courses from Geography 102, 110, 112, 116, 117, 122, 123, 124, 125A, 125B	7-8
One course from Geography 121, 122A, 122B, 123, 124, 125A, 125B	3-4
Four additional upper division, letter-graded units in Geography	4
Nine additional upper division units chosen in consultation with the undergraduate adviser	9
<b>Total Units for the Major</b>	<b>100-109</b>

### Recommended

Geography 4, Physics 8A, 8B and 8C Chemistry 8A and 8B.

### Addendum

The B.S. major provides a wide diversity of possible themes, including geomorphology, climatology, zoogeography, plant geography, nutritional geography, water-resource studies, and mathematical geography. An individual's program may emphasize one or more of these themes, and is planned in consultation with the major adviser.

### Minor Program Requirements:

Letters and Science students who do not major in Geography may satisfy the requirements for a minor in the field by successfully completing the minimum units as follows. When choices of individual courses are required, these must be made in consultation with the major adviser.

### UNITS

### Geography

**19-20**

### Minor I (General)

Geography 151, plus one course from each of the following four groups:

Geography 108, 115, or 173

Geography 170 or 171

Geography 155, 160, or 161

Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127

### Minor II (Physical)

Geography 102, 108, 115, and 173, plus one course from 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127

### Minor III (Cultural)

Geography 170, 171, and 173, plus one course from each of the following two groups: Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127, and Geography 143, 172, or 175

### Minor IV (Economic)

Geography 110 and 141 plus one course from each of the following three groups:

Geography 142, 143, or 156

Geography 160, 161, 162, or 170

Geography 121, 122A, 122B, 123, 124, 125A, 125B, 126, or 127

### Minor V (Environmental/Resource)

Geography 160, 161, 162, 173, and 175

### Minor VI (World Regional)

Geography 121, 122A or 122B, 123 or 124, 125A or 125B, 126 or 127

**Major Adviser.** See *Class Schedule and Room Directory*.

**Graduate Study.** The department offers programs of study leading to the M.A. and Ph.D. degrees. Information concerning these programs may be obtained from the Graduate Adviser, Department of Geography.

**Graduate Adviser.** See *Class Schedule and Room Directory*.

## Courses in Geography

### Lower Division Courses

#### 1. Physical Geography (4) I, II, Jett

Lecture—3 hours; laboratory—2 hours. Basic physical elements of the human habitat, especially climate, landforms, soils, and natural vegetation.

#### 2. Introduction to Cultural Geography (3) II, III. The Staff

Lecture—3 hours. Traditional systems of habitat use: their characteristics, origin, occurrence, ecology. Development of contemporary cultural patterns and patterns in man-land relationships. Emphasis on the nonindustrial world. General Education credit with concurrent enrollment in course 2G: Contemporary Societies/Introductory.

#### 2G. Introduction to Cultural Geography: Discussion (1) II, III. The Staff

Discussion—1 hour; short papers. Prerequisite: course 2 concurrently. Small group discussion of topics and readings assigned for course 2. Preparation and discussion of short papers. General Education credit with concurrent enrollment in course 2: Contemporary Societies/Introductory.

#### 3. Climate and Weather (4) I, II. Shelton

Lecture—3 hours; discussion—1 hour. Basic concepts of climate and weather; energy and moisture exchanges, atmospheric pressure, global circulation and winds; instruments for obtaining climatological data, weather maps, severe storms; global, regional, and local climate and weather; climatic change; climate of California.

#### 4. Maps and Map Interpretation (3) I. Bahre

Lecture—3 hours. Properties and components of maps. Major classes of projections. Types of maps, emphasizing relief, cadastral, thematic, and modern trends in mapping. History and development of cartography.

#### 5. Introduction to Urban and Economic Geography (3) I. The Staff

Lecture—3 hours. The location of economic and urban activities. Patterns and theories of spatial organization: resource development, agricultural and manufacturing regions, urban systems, and urban structure. General Education credit with concurrent enrollment in course 5G: Contemporary Societies/Introductory.

#### 5G. Economic and Urban Geography: Discussion (1) I. The Staff

Discussion—1 hour; short papers. Prerequisite: course 5 concurrently. Small group discussion of topics and readings assigned for course 5. Preparation and discussion of short papers. General Education credit with concurrent enrollment in course 5: Contemporary Societies/Introductory.

#### \*6. Human Impacts on the Landscape (4) I. The Staff

Lecture—4 hours. Local and global effects, through time, of human occupancy, economies, and technologies on wild and domesticated flora and fauna; soils; water; landforms; climate. Emphasis on landscape modification. Not intended for students planning to take course 161 or 170.

#### 10. The World's Regions (3) I. Dingemans; III. Jett

Lecture—3 hours. The major geographic regions of the world; their origins, physical environments, cultures and economies; their interactions and global roles. Designed for non-majors.

#### \*50. Geography and Environmental and Regional Planning (3) III. Dingemans

Lecture—3 hours. Principles of spatial planning for regional change. Policies for environmental, economic, and social modifications. Illustrated case studies include: U.S. city planning, USSR industrial and population shifts, European regional plans, Chinese agricultural and environmental programs.

#### 98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

#### 99. Independent Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor, primarily for lower division students. (P/NP grading only.)

### Upper Division Courses

#### \*102. Field Course in Physical Geography (4) III.

Elliott-Fisk

Lecture and field trip—normally one day per week. Prerequisite: courses 1 and 2 and consent of instructor. Research methodology and field study. Systematic mapping and analysis of elements of the natural landscape.

#### \*104. Field Course in Urban Geography (4) III.

Dingemans

Lecture—1 hour; full-day field trip. Field analysis of selected urban problems in California. Special attention to regional interrelationships, functional structure, and land-use changes as specifically related to the core of the city, changing residential and retail patterns, and urban encroachment on agricultural lands.

#### 105. Cartography (4) II. The Staff

Lecture—1 hour; laboratory—8 hours. Prerequisite: course 4 or consent of instructor. Compilation and generalization of base-map data; symbolization and processing of map data; cartographic design and lettering techniques; map reproduction.

#### 106. Aerial Photo Interpretation and Remote Sensing (4) III. Bahre

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 1 or consent of instructor. Basic photogrammetry, sensors and platforms, aerial-photo interpretation, and remote-sensing applications.

#### 107. Advanced Cartography (4) III. The Staff

Lecture—1 hour; laboratory—8 hours. Prerequisite: course 105. Advanced principles and techniques of cartographic representation. Emphasis on scribing, plate-making, process photography, color separation, and color proofing. Use of contemporary cartographic and photographic equipment utilized in producing maps.

#### 108. Analysis of Landforms (4) I. Elliott-Fisk

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Introduction to landforms and geomorphic processes. Topics include structural landforms, rock weathering and soil genesis, hillslope processes, and fluvial, glacial, and coastal landscapes.

#### 110. Quantitative Spatial Analysis (4) III. Dingemans

Lecture—3 hours; term paper. Prerequisite: course 1, 2, or 5, and Statistics 13 or 102 recommended. Methods for geographic research and location planning; quantitative summary and analysis of spatial data patterns and trends; optimal-location solutions; includes correlation, regression, and use of prepackaged computer programs.

#### \*112. Coastal Landforms and Landscapes (4) III.

Elliott-Fisk

Lecture—3 hours; discussion—1 hour. Prerequisite: course 108 or consent of instructor. Examination of the landforms and geomorphic processes found along coasts. Analyses of coasts in a variety of lithologic, tectonic, and "wave-climate" settings. Emphasis on the Quaternary history of coastal landscapes. Offered in even-numbered years.

#### 115. Mesoclimatology (4) III. Shelton

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Areal energy and moisture exchanges at the earth/atmosphere interface; physical controls, spatial and temporal variations, measuring and modeling the exchange processes, classification of mesoclimates. Climatic and related processes in areal systems. Human alteration of mesoclimates. Offered in odd-numbered years.

#### \*116. Climate Change (4) II. Elliott-Fisk, Shelton

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 3. Nature, magnitude, timing, and causes of climate change. Spatial and temporal climatic variations within the Quaternary emphasized. Offered in even-numbered years.

#### 117. Quaternary Environments (3) I.

Lecture—3 hours. Prerequisite: course 1 or Biological Sciences 1A or consent of instructor. Introduction to the character, timing, and magnitude of environ-

mental changes during the Quaternary (Pleistocene and Holocene). Analysis of methods of paleo-environment identification. Survey of the Quaternary record for selected regions.

#### 118. Mountain Geoecology: Physical Geography (4) II. Ives

Lecture—3 hours; term paper. Prerequisite: course 1 or other introductory natural science course. Broad overview of world mountain systems, including tectonics and structure, climate and vegetation, geomorphic processes and natural hazards. Will integrate relevant section of cognate disciplines to focus on three-dimensional character of mountain regions—a physical geography of mountains.

#### 120. Deserts of California and the Southwest (3) II. Jett

Lecture—3 hours. Prerequisite: courses 1 and 2 or the equivalent recommended. Physical and human geography of the Mojave, Sonoran, and Chihuahuan deserts of the U.S., the Colorado Plateau, and the southern Great Basin. Desert origins, climate, vegetation, and landforms. Cultures and histories of native tribes, Hispano-Americans, and Anglo-Americans. Offered in odd-numbered years.

#### \*120L. Field Excursion to Californian and Southwestern Deserts (2) III. Jett

Fieldwork—60 hours minimum (1 week). Field excursion to examine physical and human geography of selected desert areas in California and/or Nevada, Arizona, and Utah. May be repeated for credit. Limited enrollment; preference given to students having completed course 120. (P/NP grading only.) Offered in odd-numbered years.

#### \*121. North America (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Landscapes and lifeways in the United States and Canada, and the ways in which physical and human forces have contributed to their variety. Regional stresses within and between the two countries.

#### \*122A. Mexico and Central America (4) II. Bahre

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Environment, culture, and economy from Mexico to Panama and in the Caribbean. Emphasis on understanding the evolution of the diverse natural and cultural landscapes of Middle America. Approach will be cultural/historical and ecological. Offered in odd-numbered years.

#### 122B. South America (4) II. Bahre

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Environment, culture, and economy in the South American countries. Emphasis on understanding the evolution of the diverse natural and cultural landscapes of South America. The approach will be cultural/historical and ecological. Offered in even-numbered years.

#### 123. Western Europe (3) I. The Staff

Lecture—3 hours. Prerequisite: courses 1 and 2 or consent of instructor. Geographic conditions and their relation to the economic, social, and political problems of the countries of Western Europe.

#### 124. The Soviet Union and Eastern Europe (4) I.

Dingemans

Lecture—3 hours; discussion—1 hour. Prerequisite: an introductory course in the social sciences; course 2 or 5 recommended. Human use of the land in the Soviet Union and Eastern Europe. Location and nature of resources, agriculture, industry, and cities. Emphasis on modification of traditional landscapes by the Soviet model of planning for regional development. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Geography 2.

#### \*125A. North Africa and the Middle East (4) I.

Grievetti

Lecture—4 hours. Prerequisite: courses 1 and 2, or consent of instructor. Geography of the Islamic world of North Africa and Southwest Asia; climatic and physical features; cultural areas, settlement patterns, and the influence of Islam; economic patterns and development.

#### \*125B. Sub-Saharan Africa (3) II. The Staff

Lecture—3 hours. Prerequisite: courses 1 and 2, or consent of instructor. Physical, cultural, and historical geography of Africa south of the Sahara.

#### \*126. Southern Asia (3) III. The Staff

Lecture—3 hours. Prerequisite: courses 1 and 2, or consent of instructor. Physical, cultural, and historical geography of Southern Asia. Offered in even-numbered years.

#### \*127. Contemporary East Asia (4) III. Dingemans

Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in the social sciences; course 2 or 5 recommended. Human use of the earth in East Asia. Location and nature of resources, agriculture, industry, and cities. Modernization of traditional rural and urban landscapes. Emphasis on contemporary China and Japan as contrasting paths to economic development.

#### 131. California (4) III.

Lecture—3 hours; discussion—1 hour. The regional nature and variety of California: landforms, climates, vegetation, and soils; water, agriculture, and the cities. Ecological problems caused by increasing population and technological pressures on these environments.

#### 141. Organization of Economic Space (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of instructor. Survey of the principal environmental, economic, social, political, and cultural forces contributing to the regionalization of the world's economic activities. Outline of the more important regional patterns resulting from the interplay of these forces. Emphasis will also be put on these aspects as they pertain to the problems of regional disparities both within and between nations.

#### 142. Geography of Agriculture (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or consent of instructor. Distribution and areal variety of the world's food-producing areas, and the ways physical, historical, cultural, and economic factors have influenced these aspects of agriculture. Current and future trends and associated resource problems.

#### 143. Political Geography (4) I. The Staff

Lecture—3 hours; term paper. Areal differentiation of major natural and cultural phenomena affecting the world's political organization.

#### 151. History of Geographic Thought (4) III. The Staff

Lecture—3 hours; term paper. Prerequisite: three upper division courses in geography. The literature of geography: objectives, subdivisions, and development of the subject.

#### 155. Urban Geography (4) III. Dingemans

Lecture—3 hours; term paper. Prerequisite: course 5 or consent of instructor. Geography of land use within cities. The processes of change, and theories of economic and social organization of urban space. The urban landscape as a product of history, planning policy, transportation systems, and residential structure. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Geography 5.

#### \*156. The Urban Region (4) I. Dingemans

Lecture—3 hours; term paper. Prerequisite: course 5 or consent of instructor. Location and functional interdependence of cities. Relations between city and hinterland, including labor shed, service area, and economic base. Role of urbanization in regional development.

#### 160. World Resource Patterns (3) I. The Staff

Lecture—3 hours. Prerequisite: upper division standing. Principal world patterns of resource distribution. Concentrations and voids, and their significance for economic development and the welfare of the state. Focus on both natural and human resources of the geographic complex. Resource status of main economic regions.

#### \*161. Conservation of Resources and Environment (4) III.

Lecture—4 hours. Principles of natural-resource and

environmental-quality conservation. Land use conflicts between forestry, agricultural, mining, municipal, and recreational interests. Roles of industry, government, and society in creating and resolving resource and environmental problems.

**162. Geography of Water Resources** (4) I. Shelton Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Geographical survey of water on the land; needs and opportunities for water-resource development and conservation. Historical solutions to water needs of specific areas, and geographical problems associated with current and future water requirements.

**168. Mountain Geocology: Human Geography**

(4) III. Ives

Lecture—3 hours; term paper. Prerequisite: course 118, or consent of instructor. Analysis of traditional adaptations of mountain cultures to their habitats; resource use and environmental degradation; tourism impacts and Third World development issues. Emphasis on Himalayas; also Andes, Alps, and Rocky Mountains, providing historical perspective and discussion of current environmental crises.

**\*170. Cultural Ecology** (4) II. Jett

Lecture—3 hours; term paper. Prerequisite: course 2 or Anthropology 2. Geographic theories of environment-man relations. Ecologic relations of gatherers, fishermen, hunters, cultivators, and urbanites; their environmental impacts; their domestic plants and animals. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2 or Geography 2.

**171. Cultural Geography** (4) II. Jett

Lecture—3 hours; term paper. Prerequisite: course 2 or consent of instructor. Consideration of principal concepts and approaches in cultural geography in modern times, and links with, and parallels in, other disciplines. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Geography 2 or Anthropology 2.

**\*172. Animals and Culture History** (4) III. The Staff Lecture—4 hours. Prerequisite: course 2, Anthropology 2, or consent of instructor. Theories of animal domestication; spread of domesticated animals in Old and New Worlds; contrasting roles of domesticated animals in human ecology through time; pastoral nomadism and other animal-based economies.

**173. Humans and Vegetation Change** (4) III. Bahre Lecture—3 hours; term paper. Prerequisite: course 1 or Biological Sciences 1A, or consent of instructor. Role of humans in modifying the earth's vegetation. Emphasis on cultural plant geography, factors of plant distribution, classification and mapping of vegetation, world vegetation patterns, human impact on major regions, and case studies of land use and vegetation change.

**\*175. Geography of Food and Diet** (4) I. Grivetti

Lecture—4 hours. Prerequisite: course 2 or Anthropology 2; Nutrition 20 recommended. Consideration of the cultural and environmental factors that influence dietary practices; historical development of food habits; food use in different economic systems, both traditional and contemporary. Offered in even-numbered years.

**192. Student Internship in Geography** (2-4) I, II, III.

The Staff

Internship—5-15 hours at employing agency; term paper. Prerequisite: consent of undergraduate Geography major adviser and consent of instructor. Supervised program of student internships with public agencies dealing with geographical problems. The application and evaluation of theoretical concepts through work experience with a variety of assignments and work schedules. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

**199. Special Study for Advanced Undergraduates.** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

**Graduate Courses**

**200. Research Trends in Geography** (1) I. The Staff (Chairperson in charge) Seminar—1 hour. Major current research themes and trends in geography. (S/U grading only.)

**201. Sources and General Literature of Geography** (4) I, II, III. The Staff

Discussion—4 hours. Prerequisite: graduate status 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.

**\*290. Seminar: Selected Regions** (4) III.

Seminar—3 hours. Region to be announced annually.

**291. Seminar in Cultural Geography** (4) I. Jett Seminar—3 hours.

**\*292. Seminar in Plant Geography** (4)

Seminar—3 hours; seminar paper. Prerequisite: graduate standing. Examination of that aspect of cultural plant geography dealing with human impacts and vegetation change in the earth's major biomes. Particular emphasis on the New World's savannas, deserts, and grasslands. Offered in odd-numbered years.

**\*293. Seminar in Political Geography** (4) I.

Seminar—3 hours.

**294. Seminar in Climatology** (4) II. Shelton Seminar—3 hours.

**295. Seminar in Urban Geography** (4) III. Dingmans Seminar—3 hours.

**296. Seminar in Agricultural Geography** (4) III. The Staff Seminar—3 hours.

**298. Group Study** (1-5) I, II, III. The Staff Prerequisite: consent of instructor.

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

**299D. Individual Study** (1-12) I, II, III. The Staff Prerequisite: graduate student status in Geography and consent of instructor. (S/U grading only.)

**The Major Programs**

"Civilization exists by geological consent—subject to change without notice."

Will Durant

Geology is a science that has the whole Earth and other planetary bodies as its laboratory. In effect, it is an extension of history and archaeology to a much longer time scale and less well-preserved record. Geology involves the application of biology, chemistry, and physics to the study of the past and present Earth and its neighbors in space. Geologists appreciate Earth and other planets from three different perspectives—scientific, human, and aesthetic. The scientific perspective involves an understanding of the planets and how and why they change and evolve. The human perspective involves the geology responsible for Earth hazards such as earthquakes, volcanic eruptions, landslides, the concentration of mineral resources, and the ever-increasing problems of air and water supply. The aesthetic level involves enjoyment of the natural beauty of the subjects we study, such as the mountains, the lakes, the river valleys, the seashores, or even crystals in a microscope.

Geologists practice their profession in a variety of settings—resources and environmental industries, government organizations and research laboratories, and colleges and universities. In addition, there is a growing need for earth science teachers at all pre-college levels. A degree in geology from Davis provides the student with an excellent preparation for graduate study or for professional employment.

Students interested in becoming professional geologists or continuing their geological studies at the graduate level should elect the Bachelor of Science degree program. The Bachelor of Arts program is designed for students interested in an interdisciplinary program of study, or who plan to go into teaching. Requirements for both programs include a number of elective courses that provide students opportunities to emphasize different aspects of the field. Courses to fulfill these elective requirements must be chosen to provide a coherent and in-depth program of study and must be approved by an undergraduate adviser before they are taken. In either program, additional courses may be elected to increase the depth or breadth of a student's knowledge.

High school students should note that the preparation for either program requires high school chemistry and four years of mathematics or the equivalent. Transfer students applying to the B.S. degree program will find it helpful to have completed a course in physical geology with laboratory or mineralogy with laboratory and the equivalent of either Chemistry 1A-1B-1C or Physics 5A-5B-5C, as well as Mathematics 21A-21B-21C.

**Honors.** Students majoring in Geology who are eligible for Honors at graduation, who have completed at least 135 units, and who have attained a grade-point average of at least 3.5 in courses required for the major may further qualify for High or Highest Honors by completing the two-course sequence, Geology 194HA and 194HB. This senior honors project serves as a basis on which a supervising committee may recommend the award of High or Highest Honors.

**A.B. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter</b> .....44-45	
Geology 3, 3L, 50, 50L, 60, 60L.....14	
Mathematics 16A-16B-16C or 21A-21B.....8-9	
Chemistry 1A-1B or 4A-4B .....10	
Physics 5A-5B-5C .....12	
<b>Depth Subject Matter</b> .....39	
Geology 102, 105, 105L, 106, 110, 110L, 122, 123 .....27	
Additional upper division electives chosen from selected courses in geology and related fields approved in advance by the major adviser (see adviser for list of	

approved courses).....	12
<b>Total Units for the Major</b> .....	<b>83-84</b>

**Recommended**

Chemistry 1C or 4C; Geology 3, 3L; Statistics 13 or 102.

**B.S. Major Requirements:**

	UNITS
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**Preparatory Subject Matter**.....**56**

Geology 3, 3L, 50, 50L, 60, 60L.....	14
Mathematics 21A-21B-21C.....	12
One course chosen from Mathematics 22A, 22B, 22C, Statistics 32, 102.....	3
Chemistry 1A-1B-1C; or preferably 4A-4B-4C.....	15
Physics 8A-8B-8C or 6A-6B-6C.....	12

**Depth Subject Matter**.....**54**

Geology 102, 105, 105L, 106, 110, 110L, 118, 122, 123.....	35
Geology 190 (repeat course at least once).....	2
One course chosen from Geology 124, 125.....	5
Additional upper division electives chosen from selected courses in geology and related fields approved <i>in advance</i> by major adviser (see adviser for list of approved courses).....	12
<b>Total Units for the Major</b> .....	<b>110</b>

**Recommended**

Electives for general geology emphasis: Geology 108, 108L, completion of 124, 125 sequence plus one other course (consult adviser).

Additional recommended courses: one or more of the following courses, depending on emphasis in geology: Mathematics 22A, 22B, 22C, Statistics 104, 106, 108, 110.

**Major Advisers.** A.B. degree: C.G. Higgins; B.S. degree: C.G. Higgins, S.V. Margolis, R.J. Twiss.

**Minor Program Requirements:**

Students in other disciplines may elect to complete a minor in Geology by choosing a geological subject emphases listed below. On transcripts the minor will appear as a minor in *Geology*.

UNITS
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**General Geology** emphasis.....**22**

Geology 50 and 50L (or 1, 1G, and 1L).....	5
Geology 105, 105L, 106.....	9
Geology 108 and 108L or 110 and 110L.....	5
Geology 113, 115, or 116.....	3

**Minor Advisers.** C.G. Higgins, R.J. Twiss.

**Engineering Geology** emphasis.....**19-22**

Geology 50 and 50L.....	5
Civil Engineering 171, 172.....	5
Three courses chosen from Civil Engineering 175, Geology 117A, 117B, 134, Soil Science 118, 120 Water Science 142, 149.....	9-12
<b>Minor Adviser.</b> R.A. Matthews	

**Environmental Geology** emphasis.....**23-25**

Geology 130, 134, and 152 or Geography 106.....	10
Soil Science 118.....	4
Water Science 141 or Civil Engineering 142.....	3
Two courses chosen from	

Environmental Studies 160, 171, 179	
Geology 135, 154 or Geography 108	
Resource Sciences 100	
Water Science 149.....	6-8
<b>Minor Adviser.</b> R.A. Matthews	

**Geochemistry** emphasis.....**18-20**

Chemistry 110A, 110C.....	6
(Chemistry majors must substitute one of the elective courses for Chemistry 110C.)	
Geology 60, 60L, 115, 180.....	9

One elective course chosen from Chemical Engineering 151, Chemistry 126, Engineering 130, 134, Geology 150A, Soil Science 102, Water Science 180.....3-5

**Minor Adviser.** R.E. Criss.

**Geomorphology** emphasis.....**22**

Geology 50 and 50L (or 1, 1G, and 1L).....	5
Geology 152 or Geography 106.....	4
Geology 153 or Geography 108.....	4
Geology 135 or 154.....	3

At least six additional units chosen from

Civil Engineering 171, 172, 177	
Geography 112, 117, 118	
Soil Science 118, 120	
Water Science 141 or Civil Engineering 142.....	6

**Minor Adviser.** C. G. Higgins.

**Geophysics** emphasis.....**21-24**

Geology 117A, 117B, S181.....	9
Applied Science Engineering 115.....	3

One course sequence chosen from the following.....9-12

(a) Atmospheric Science 120, 121A, 121B;	
(b) Electrical and Computer Science Engineering 112, 151, 161;	
(c) Geology 105, 162, Physics 105C;	
(d) Mathematics 128A, 128B, 128C;	
(e) Physics 104A, 104B, 105C.	

**Minor Adviser.** J. S. McClain.

**Oceanography** emphasis.....**20-25**

Geology 106, 116, 150A, 150B, 150C.....	17
One course chosen from Environmental Studies 100, 151, Geology 111A, 111B, S119, Water Science 180.....	3-8
<b>Minor Adviser.</b> S. V. Margolis.	

**Paleobiology** emphasis.....**18-21**

Geology 110 and 110L or 107 and 107L.....	5
Geology 111A or 111B; 145 or 146.....	7

At least six additional units from the following: Anthropology 151 or 152 Botany 116, 140 Genetics 103, Geology 111A, 111B, 145, 146, 150C Zoology 105, 112, 125, 148.....6-9

**Minor Adviser.** R.J. Twiss.

**Teaching Credential Subject Representative.** C.G. Higgins. See also under Teacher Education Program.

**Graduate Study.** The Department of Geology offers a program of study and research leading to the M.S. and Ph.D. degrees. For information regarding graduate study in geology, address the Graduate Adviser, Department of Geology.

**Graduate Advisers.** J.F. Mount, J.S. McClain.

**Courses in Geology****Lower Division Courses****1. The Earth** (3) I, II. The Staff

Lecture—3 hours. Introduction to study of the Earth for those not majoring in geology or associated sciences. Not open for credit to students who have taken course 50. General Education credit with concurrent enrollment in course 1G: Nature and Environment/Introductory.

**1G. Earth: Discussion** (1) I, II. The Staff

Discussion—1 hour. Prerequisite: course 1 concurrently. Small group discussions and preparation of short papers for course 1. General Education credit with concurrent enrollment in course 1: Nature and Environment/Introductory.

**1L. Earth Laboratory** (1) I, II. The Staff

Laboratory—3 hours. Prerequisite: course 1 (preferably taken concurrently). Introduction to Earth materials (minerals and rocks), crustal deformation (faults and folds), landforms, and the processes that form them. Not open for credit to students who have taken course 50L.

**3. History of Life** (3) III. The Staff

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. General Education credit with concurrent enrollment in course 3G; Nature and Environment/Introductory.

**3G. History of Life: Discussion** (1) III. The Staff

Discussion—1 hour. Prerequisite: course 3 concurrently. Small group discussion and preparation of short papers for course 3. General Education credit with concurrent enrollment in course 3: Nature and Environment/Introductory.

**3L. History of Life Laboratory** (1) III. The Staff

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.

**12. Evolution and Paleobiology of Dinosaurs** (2)

III. Carlson, Cowen  
Lecture—2 hours. Introduction to evolutionary biology, paleobiology, ecology and paleoecology, using dinosaurs as case studies.

**17. Earthquakes and Other Earth Hazards** (2) I.

Verosub  
Lecture—2 hours. The impact of earthquakes, volcanoes, landslides and floods on Man, his structures and his environment. Discussion of the causes, effects, and solution of geologic problems in rural and urban settings.

**20. Geology of California** (2) II. Matthews

Lecture—2 hours; demonstration—1 hour. 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.

**43. Form, Function, and Evolution: The Molluscan Shell** (3) II. Vermeij

Lecture-discussion—2 hours; term paper. Prerequisite: course 1, 3, or Biological Sciences 10. Evolutionary principles relating form, function, and environment are explained through the study of shells of living and fossil molluscs. Topics include shell geometry, mechanical design, adaptation to enemies, and the distribution of shell architectural types in space and time. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Geology 1 or 3 or Biological Sciences 10.

**50. Physical Geology** (3) II. Green

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 1L or the equivalent may receive only 2 units for course 50L.

**50L. Physical Geology Laboratory** (2) II. Green

Laboratory—6 hours; one or two one-day field trips. Prerequisite: course 50 (preferably taken concurrently). Introduction to classification and recognition of minerals and rocks and to interpretation to topographic and geologic maps and aerial photographs. Students with credit for course 1L or the equivalent may receive only 1 unit for course 50L.

**60. General Mineralogy** (3) I. Hofmeister

Lecture—3 hours. Prerequisite: Chemistry 1A or 4A. Crystallography; physical and chemical structure and properties of minerals; mineral genesis.

**60L. General Mineralogy Laboratory** (2) I.

Hofmeister  
Laboratory—6 hours. Prerequisite: course 60 (preferably taken concurrently). Morphological crystallography; stereographic projection; identification of the common rock-forming minerals.

**99. Special Study for Undergraduates** (1-5) I, II, III.

The Staff (Chairperson in charge)  
Prerequisite: consent of instructor; lower division standing. (P/NP grading only.)

**Upper Division Courses****102. Field Geology** (5) III. Twiss

Lecture—1 hour; laboratory—2 hours; field study—8 full days. Prerequisite: courses 105L, 106, 123, 124

(may be taken concurrently); course 125 recommended. Instruction in geologic mapping techniques; field geologic study of selected areas to expose students to a variety of geologic features. A geologic map, cross-section stratigraphic section and description of geologic rock units is required (30 hours minimum).

**105. Structural Geology** (3) II. Twiss

Lecture—3 hours. Prerequisite: courses 50-50L; Physics 5A or 9A; Mathematics 21A, 21B recommended. Description and origin of the deformational features of the earth's crust. Brittle deformation, stress, faults and fractures; ductile deformation, strain, folds and foliations. Experimental rock deformation.

**105L. Structural Geology Laboratory** (2) II. Twiss

Lecture-laboratory—3 hours; two or three one-day field trips and reports. Prerequisite: course 105 (concurrently); high school trigonometry and geometry. Graphical solutions to structural problems, introduction to field methods and field mapping, interpretation of geologic maps.

**106. Ancient Environments** (4) I. Margolis

Lecture—3 hours; laboratory—3 hours (includes 3 one-day field trips). Prerequisite: courses 50, 50L. Study of modern and ancient environments from continents, coasts, shelves and deep oceans. Ecology of fossils, sedimentary processes; stratigraphy, identification of diagnostic rock types, geological map making; recognition of ancient environments.

**107. Principles of Paleobiology** (3) III. Cowen

Lecture—3 hours. Prerequisite: courses 3-3L or Biological Sciences 1B. The evolution and ecological structure of the biosphere from the origin of life to the present, with special emphasis on the oceanic environment during the last 600 million years. No credit allowed to those who have completed course 110.

**107L. Principles of Paleobiology Laboratory** (2) III. Cowen

Laboratory—6 hours. Prerequisite: courses 3-3L or Biological Sciences 1B; course 107 (concurrently). Exercises in determining the ecological functions and evolution of individuals, populations, and communities of fossil organisms in field and laboratory. No credit allowed to those who have completed course 110L.

**108. Regional Structure and Stratigraphy** (3) III. Moores

Lecture—3 hours. Prerequisite: courses 105, 105L, 106. Global tectonic features and processes. Structure, stratigraphy, and evolution of large-scale features of the earth's crust; shield and platforms, continental margins, ocean basins, plate boundaries and mountain belts.

**108L. Regional Structure and Stratigraphy Laboratory** (2) III. Moores

Laboratory—6 hours; two one-day field trips. Prerequisite: course 108 (preferably taken concurrently). Illustration of topics covered in course 108. Emphasis on the interpretation of geologic history using geologic maps selected from a variety of structural and stratigraphic provinces.

**110. Introductory Paleontology** (3) I. The Staff

Lecture—3 hours. Prerequisite: courses 3, 3L. Provides geology majors with a thorough introduction to the fossil record, interpretation of data from the fossil record, and associated problems of evolution, paleoecology, and biostratigraphy. Not open to students who have received credit for course 107.

**110L. Invertebrate Paleontology Laboratory** (2) I. The Staff

Laboratory—6 hours. Prerequisite: courses 3, 3L, 110 (may be taken concurrently). Systematics and morphology of the major invertebrate fossil groups, with special emphasis on interpretation of fossil paleoecology and evolution.

**\*111A. Paleobiology of Invertebrates** (4) I. Cowen

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Morphology, systematics, evolution, and ecology of the major phyla of invertebrates. Offered in odd-numbered years.

**\*111B. Paleobiology of Protista** (4) II. The Staff

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Morphology, systematics, evolution, and ecology of single-celled organisms. Offered in odd-numbered years.

**113. The Solar System** (3) III. Hofmeister

Lecture—3 hours. Prerequisite: one course in physical science. 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 geologic processes. Search for life. Origin and evolution of the solar system. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: any introductory physical science GE course in the area of Nature and Environment.

**113G. The Solar System: Discussion** (1) III. Hofmeister

Discussion—1 hour. Prerequisite: course 113 concurrently. Small discussion groups and preparation of papers for course 113.

**115. Geochemistry** (3) I. Criss

Lecture—3 hours. Prerequisite: Chemistry 1A (may be taken concurrently); course 50. Application of principles of solution, physical, structural, colloidal, and isotopic chemistry to geologic problems. Formation of carbonate rocks and other chemical sediments, rock weathering, and clay mineral formation. Magmatic, metamorphic, and hydrothermal processes and radiometric dating techniques.

**116. The Oceans** (3) II. Margolis

Lecture—3 hours. Prerequisite: upper division standing or consent of instructor. Introductory survey of the marine environment. Oceanic physical phenomena, chemical constituents, geological history, and the sea's biota; and utilization of marine resources. (Same course as Environmental Studies 116.) General Education credit with concurrent enrollment in course 116G: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Science 10, Chemistry 10, or Geology 1.

**116G. The Oceans: Discussion** (2) II. Margolis

Discussion—2 hours. Prerequisite: course 116/Environmental Studies 116 concurrently. Scientific method applied to discovery of the processes, biota and history of the oceans. Group discussion and preparation of papers. (Same course as Environmental Studies 116G.) General Education credit with concurrent enrollment in course 116: Nature and Environment/Non-Introductory. Recommended GE preparation: see course 116 above.

**117A. Geophysics: Gravity and Magnetics** (3) II. Verosub

Lecture—3 hours; field experience with geophysical instruments. Prerequisite: Physics 9C and Mathematics 21C or consent of instructor. Introduction to the use of physics in the study of earth structures and processes: gravity, paleomagnetism, geomagnetism. Application to geophysical exploration as well as solid earth geophysics.

**117B. Geophysics: Seismology and Heat Flow** (3) II. McClain

Lecture—3 hours; field experience with geophysical instruments. Prerequisite: Physics 5B or 9B and Mathematics 21C or consent of instructor. Introduction to the use of physics in the study of earth structures and processes: seismology, heat flow. Application to geophysical exploration as well as solid earth geophysics.

**118. Summer Field Geology** (8) Extra-session summer. Mount

Six weeks in field. Prerequisite: course 102. Preparation of a geologic map and report on a selected field area.

**122. Optical Mineralogy** (3) II. The Staff

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 60, 60L or consent of instructor. Optical properties of crystals and techniques of mineral identification with the petrographic microscope.

**123. Igneous Petrology** (5) III. The Staff

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 122. Origin and occurrence of igneous rocks.

Laboratory exercises emphasize the study of these rocks in hand specimen and thin section.

**124. Sedimentary Petrology** (5) II. Mount

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 122. Origin and occurrence of sedimentary rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section.

**125. Metamorphic Petrology** (5) I. Day

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 122; course 123 recommended. Occurrence and origin of metamorphic rocks. Laboratory exercises emphasize the study of these rocks in hand specimen and thin section.

**130. Non-Renewable Natural Resources** (3) I. Matthews

Lecture—3 hours. Prerequisite: course 1. 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.

**\*131. Earth Science, History, and People** (4) I. Cowen

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 like earthquakes and eruptions as well as the geology of resources, topography, and water. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Geology 1-1G.

**134. Environmental Geology and Land Use Planning** (3) II. Matthews

Lecture—3 hours. Geologic aspects of land use and development planning. Problems concerning waste disposal, land stability, earthquake prediction. Analytic techniques, presentation of reports, and legal aspects of selected case studies.

**135. Rivers of California: Geology and Land Use** (3) III. Mount

Lecture—2 hours; discussion-laboratory—3 hours. Prerequisite: courses 1, and 1G or 1L. Analysis of the conflict between geologic processes and the urbanization and resource exploitation of California's watersheds. Mining, logging, and dam construction. Case studies of Sierra Nevada watersheds. Field study includes two raft trips on Sierran rivers and visit to Auburn Dam site. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Geology 1.

**\*138. Seminar In Stratigraphic Paleontology** (3) III. The Staff

Lecture—1 hour; seminar—2 hours. Prerequisite: courses 3, 3L, 106. Introduction to zone and range concepts, geologic time, and pertinent aspects of codes of stratigraphic and zoological nomenclature. Participants analyze major evolutionary developments within animal, protistan and plant phyla as keys to geological age determinations.

**\*140. Geologic Data Collection and Report Presentation** (2) III. The Staff

Lecture—2 hours. Prerequisite: upper division standing and a major in Geology. Collection, organization and presentation of data for geologic reports. Participants will analyze published reports, write syntheses of published reports and write abstracts.

**144. Evolution and the Fossil Record** (4) II. Signor

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3. Patterns of evolution recorded in the geologic record. Models of organic evolution. Origination and extinction of taxa. The Neo-Darwinian synthesis and its impact on the interpretation of the fossil record. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Geology 3.

**\*145. Paleoecology** (3) II. Signor

Lecture—3 hours. Prerequisite: course 107. Principles and methods of environmental reconstruction of ancient animal and plant communities. Course includes statistical methods in paleoecology; principles of biostratigraphy.

**146. Evolutionary Paleontology** (3) I. Vermeij

Lecture—3 hours. Prerequisite: course 107 or 110. Principles of evolution from the special perspective of the fossil record. Facts and inferences on the origin of species and higher taxa. Survey of adaptive radiations and major extinctions.

**150A. Physical and Chemical Oceanography** (4)

III. Powell (Environmental Studies)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 116 or Environmental Studies 116; Physics 9B; Mathematics 22C; Chemistry 1C; or upper division standing in a natural science and consent of instructor. Physical and chemical properties of seawater, fluid dynamics, air-sea interaction, currents, waves, tides, mixing, major oceanic geochemical cycles. Offered in odd-numbered years. (Same course as Environmental Studies 150A.)

**150B. Geological Oceanography** (3) II. The Staff

Lecture—3 hours. Prerequisite: course 50 or 116. 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 Studies 150B.)

**\*150C. Biological Oceanography** (3) III. Powell

(Environmental Studies)

Lecture—3 hours. Prerequisite: Biological Sciences 1A and a course in general ecology or consent of instructor. Survey of the ecology of major marine habitats including intertidal, shelf benthic, deep-sea, and plankton communities. Existing knowledge and contemporary issues in research will be equally stressed. A portion of the course will be devoted to man's use of and impact on the ocean. Offered in even-numbered years. (Same course as Environmental Studies 150C.)

**\*152. Photogeology and Remote Sensing** (4) II.

Higgins

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 1L or 50L; course 105 recommended. Field use of aerial photographs: types and availability, stereoviewing, and basic geometry. Geological uses and interpretation of aerial photographs and of images obtained by remote sensing.

**\*153. Geomorphology** (4) II. Higgins

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 50-50L or 1-1L; Geography 1 recommended. Landforms, landscapes, and the processes that shape them. An introduction to geomorphic observation and theory. Alternates with and complements course 154. Offered in even-numbered years.

**\*154. Environmental Geomorphology** (3) II. Higgins

Lecture—3 hours. Prerequisite: courses 50-50L or 1-1L; Geography 1 recommended. Aspects of geomorphology that relate to Man's use of the natural environment. Alternates with and complements course 153. Offered in odd-numbered years.

**162. Stress and Deformation** (4) II. Green

Lecture—3 hours; discussion—2 hours. Prerequisite: Mathematics 21C and Physics 9B; Mathematics 22A, 22C, and Physics 9C recommended. Introduction to tensor analysis: tensor notation transformations, representation quadric, Mohr-circle construction; stress, strain; strain-rates, elasticity. Solution of general, three-dimensional problems with geological application.

**\*165. Seismic Stratigraphy** (3) III. McClain

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 106, 117A, 117B, or consent of instructor. Seismic stratigraphy as an exploratory tool. Obtaining and processing seismic reflection data. Sound propagation in sediments. Interpretation and analysis of seismic records. Relationships between seismic data and depositional environments.

**\*170. Geology of Ore Deposits** (4) I. Criss

Lecture—3 hours; laboratory—3 hours; four-day field trip (including weekend). Prerequisite: courses 60-60L and 105L. Examination of major metallic ore-types using principles of plate tectonics, structural geology, petrology, and geochemistry. Laboratory study of selected ore deposits.

**180. Sample Preparation and Techniques** (1) II.

Winter

Laboratory—3 hours. Prerequisite: course 122. Introduction to petrographic laboratory techniques for petrographers. Topics covered may include thin and polished section preparation, rock crushing/grinding, mineral separation, staining, and photomicroscopy. (P/NP grading only.)

**185. Advanced Field Geology** (1-6) I, II, III. The Staff

Fieldwork—3-18 hours; report. Prerequisite: course 118 or graduate standing in Geology. Advanced problems and methods in geologic field studies; preparation of a geologic report. May be repeated for total of 6 units when different subject matter studied.

**190. Seminar in Geology** (1) I, II, III. The Staff

Discussion—1 hour; seminar—1 hour. Prerequisite: major in Geology. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. May be repeated for credit. (P/NP grading only.)

**192. Internship in Geology** (1-12) I, II, III. The Staff

(Chairperson in charge)

Work-learn experience. Prerequisite: upper division standing; project approval prior to internship. Supervised work-learn experience in geology. May be repeated for credit for a total of 10 units. (P/NP grading only.)

**194HA-194HB. Senior Honors Project** (3-3) I, II, III.

The Staff (Chairperson in charge)

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.)

**198. Directed Group Study** (1-5) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: senior standing in geology or consent of instructor.

**199. Special Study for Advanced Undergraduates**

(1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses****206. Stratigraphic Analysis** (3) III. Mount

Lecture—3 hours. Prerequisite: courses 105L and 106 or consent of instructor. Advanced historical geology; analysis of stratigraphy and geologic history of North America and selected parts of other continents. Emphasis on interpreting lithologic assemblages and stratigraphic relations in terms of modern tectonic-depositional models. Offered in odd-numbered years.

**\*209. Origin and Significance of Metamorphic Textures** (4) III. Green

Seminar—3 hours; laboratory—3 hours. Interpretation of metamorphic textures in terms of surface energy anisotropy, growth anisotropy, crystal deformation processes, and disequilibrium phenomena. Offered in even-numbered years.

**213. Studies in Geomorphology** (3) I. Higgins

Lecture-seminar—3 hours. Prerequisite: course 153 or Geography 108. Topics selected from: studies of landforms and landscape development and of the action of formative processes; methods of analysis of geomorphic problems; development of geomorphic theory. Topics change from year to year. May be repeated three times for credit.

**\*215. Advanced Geochemistry** (3) I. Criss

Lecture—3 hours. Prerequisite: course 115, Chemistry 110A or consent of instructor. Principles and applications of nuclear chemistry to geology: radioactive and stable isotope geochemistry. Trace element geochemistry. Topics covered include age and origin of earth materials, geothermometry, paleoclimates, and applications to the study of earth processes.

**216. Tectonics** (3) I. Moores

Seminar—3 hours. Prerequisite: course 108 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.

**217. Topics in Geophysics** (3) III. Verosub

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 odd-numbered years.

**218A. Structural Analysis I: Macrofabrics** (3) II.

Twiss

Seminar—3 hours. Prerequisite: consent of instructor. Geometric and kinematic analysis and interpretation of mesoscopic and macroscopic geologic structures and fabrics; geometry of folding, superposed folding, and folded lineations; symmetry arguments in the interpretation of fabrics; determination of slip lines of deformation; regional structural synthesis. Offered in odd-numbered years.

**218B. Structural Analysis II: Microfabrics** (4) III.

Green

Seminar—3 hours; laboratory—3 hours. Prerequisite: consent of instructor; course 218A recommended. Microscopic structural aspects of deformed metamorphic rocks, emphasizing deformation features and the origin and significance of preferred crystallographic orientation. Offered in odd-numbered years.

**\*220. Mechanics of Geologic Structures** (3) III.

Twiss

Lecture—2 hours; seminar—1 hour. Prerequisite: course 162, or consent of instructor and course 105. Application of principles of continuum mechanics to understanding development of geologic structures such as folds, fractures, faults, dikes, cleavage, boudinage. Offered in even-numbered years.

**\*226. Advanced Sedimentation and Sedimentary Petrology** (4) III. Mount

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 124 or consent of instructor. Advanced petrographic and stratigraphic study of major sedimentary rock suites. Lecture emphasis on recognition and interpretation of the spatial and temporal variations in sedimentary rock textures and mineralogies. Laboratory focus on provenance and diagenesis. Subjects vary yearly. May be repeated for credit. Offered in even-numbered years.

**228. Marine Geology** (3) II. Margolis

Lecture—3 hours. Prerequisite: courses 106, 116, 150B or 165, or consent of instructor. Critical discussions and review of selected topics in marine geology such as paleoceanography, biostratigraphy of the ocean basin, evolution of ocean basins and margins, and sea-bed mineral resources. Topics vary yearly. May be repeated for credit.

**\*230. Advanced Mineralogy** (3) III. Hofmeister

Lecture—3 hours. Prerequisite: course 60 or the equivalent; undergraduate background in petrology. Crystallography and crystal chemistry of the major rock forming minerals. Principles of mineral behavior. Offered in even-numbered years.

**231. Mineral Physics Seminar** (3) I. Hofmeister

Seminar—3 hours. Prerequisite: course 230. Critical review of selected topics in mineral physics (e.g., the earth's thermal state; elastic properties and equations of state; phase transitions and mantle petrology; earth's structure and its evolution; transport phenomena in the earth's interior). May be repeated for credit. Offered in odd-numbered years.

**\*236. Inverse Theory in Geology and Geophysics** (3) III. McClain

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 even-numbered years.

**238. Theoretical Seismology** (3) II. McClain

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. (P/NP grading only.) Offered in odd-numbered years.

**240. Geophysics of the Earth** (3) III. McClain

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 odd-numbered years.

**\*241. Geomagnetism (3) I.** Verosub

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 odd-numbered years.

**242. Paleomagnetism (3) I.** Verosub

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 even-numbered years.

**\*245. Metamorphic Petrology (5) I.** Day

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 125 or consent of instructor. Metamorphic processes; origin and characteristics of metamorphic rocks; laboratory study of representative rock suites in hand specimen and thin section. Offered in even-numbered years.

**\*246. Physical Chemistry of Metamorphic Processes (3) II.** Day

Lecture—3 hours. Prerequisite: course 125, Chemistry 110A, or consent of instructor. Physiochemical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks. Offered in even-numbered years.

**247. Metamorphic Petrology Seminar (3) II.** Day

Seminar—3 hours. Prerequisite: course 245; 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 is different. Offered in odd-numbered years.

**250. Advanced Geochemistry Seminar (3) III.** Criss Seminar—3 hours. Prerequisite: course 115 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 odd-numbered years.

**254. Phase Equilibria (3) I.** The Staff

Seminar—3 hours. Prerequisite: Chemistry 1C and Mathematics 22A; physical chemistry recommended. Physiochemical aspects of the phase relations in silicate systems and their application to the petrogenesis of igneous and metamorphic rocks.

**260. Paleontology (3) I.** Carlson; II. Signor; III. Vermeij Seminar—3 hours. Prerequisite: course 111A or 111B, or graduate standing in a biological science. Selected problems in paleontology. Subject to be studied will be decided at an organizational meeting.

**\*263. Functional Morphology of Fossil Invertebrates (4) III.** Cowen

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 111A or Zoology 112. Principles and methods of functional analysis of fossils, with special reference to selected problems in invertebrate phyla. Offered in even-numbered years.

**\*269. Evolutionary Biology of Protista (3) II.** The Staff

Seminar—3 hours. Prerequisite: course 111B. Analysis and discussion of selected topics on the evolution of single-celled organisms with emphasis on their fossil record and biology. Offered in even-numbered years.

**\*280. Igneous Petrology (3) III.** The Staff

Seminar—2 hours; laboratory—3 hours. Prerequisite: course 123. Integrated laboratory, field study, and

seminar on igneous processes and products.

**282. Geological X-Ray Spectrometric Analysis (4) III.** Schiffman

Lecture—3 hours; laboratory—3-4 hours. Prerequisite: course 60, Chemistry 4C, Physics 9D, graduate standing in Geology. Theory of generation and detection of x-rays as applied to analytical chemistry of rocks and minerals. Laboratory sessions on use of the x-ray fluorescence spectrometer, electron microscope, and x-ray diffractometer.

**290. Seminar in Geology (1) I, II, III.** The Staff

Seminar—1 hour; discussion—1 hour. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. (S/U grading only.)

**291. Geology of the Sierra Nevada (1) III.** Day, Moores

Seminar—one day-long session. 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.)

**295. Advanced Problems in Geodynamics (3) III.** Twiss

Seminar—3 hours. Prerequisite: course 105 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. (S/U grading only.) Offered in odd-numbered years.

**296. Advanced Problems in Tectonics (3) II.** Moores

Seminar—3 hours. Prerequisite: course 108 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. (P/NP grading only.)

**298. Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

**299. Research (1-12) I, II, III.** The Staff (Chairperson in charge) (S/U grading only.)

philosophy, economics, etc. Accordingly, the Department offers a major with three tracks: (a) Literature; (b) Language; (c) German Area Studies. The Department's primary emphasis on literary periods, movements, and themes is reflected in the solid core of upper division courses in German literature that form an integral component of each track. Completion of the major will prepare the student for graduate study in German. All three tracks prepare students for career opportunities in fields such as international relations, business, the sciences, and the arts.

## A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b>	<b>8-23</b>
German 1-2-3 (or the equivalent) .....	0-15
German 4 or 6A-6B .....	4
German 51 .....	4
<b>Depth Subject Matter</b>	<b>44</b>
<b>German Literature Emphasis</b>	
German 101, 102 .....	8
German 120 .....	4
Three courses chosen from upper division literature courses that are taught in German .....	12
Five additional upper-division literature courses .....	20
Including one or more courses in Comparative Literature, another national literature, or German literature in translation chosen in consultation with adviser.	
<b>German Area Studies Emphasis</b>	
German 101, 102 .....	8
German 120 .....	4
Three courses chosen from upper division literature courses that are taught in German .....	12
History 144 .....	4
Four elective courses in accordance with student's interest .....	16
Courses chosen from at least two of the following three areas after consultation with and approval by adviser.	
Humanities: History 143, Philosophy 170, 175, 176.	
Social Sciences: Economics 174, Geography 123, Political Science 117, 137.	
Fine Arts: Art 176C, 177A, 177B, Music 110A, 110C, 110D.	
Special consideration also given to such courses in Comparative Literature as the 164 series, where pan-European movements influential upon German literature are at issue.	
<b>German Language Emphasis</b>	
German 101, 102 .....	8
Three courses chosen from upper division literature courses that are taught in German .....	12
German 120 .....	4
German 104A, 104B .....	8
Three courses selected from German 105, 106, 107, 108, 109A, 109B .....	12
Recommended: Linguistics 1	
<b>Total Units for the Major</b>	<b>44-70</b>

## Minor Program Requirements:

The Department offers a German Language minor and a German Literature minor. In addition, individualized minor programs may be designed upon consultation with the undergraduate adviser.

Students are particularly encouraged to consider a minor that combines a coherent group of courses to emphasize area studies in German (i.e., German philosophy, the arts, history, political science, as well as literature). The purpose of the minor is to provide students with the opportunity to augment their training in other fields by acquiring proficiency in the German language and exposure to German literature and culture.

## UNITS

**German Language.....18-24**

Choose courses numbered from German 100A through 109B.....18-24

**German Literature.....18-24**

Choose courses numbered from German 101-102, 120 and literature courses that are taught in German.....18-24

One lower division course from German 48 to 52 may be counted.

**Major Advisers.** C. Bernd, P. Schaeffer.

**Honors and Honors Program.** The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination. See also the University and College requirements.

**Teaching Credential Subject Representative.** I. Henderson. See also under the Teacher Education Program.

**The Master of Arts Degree.** The Department offers programs of study leading to the M.A. degree under both Plan I (thesis) and Plan II (comprehensive final examination). A minimum of 30 units is required for Plan I, and a minimum of 36 units for Plan II. Further information may be obtained by writing to the Department Chairperson or the Graduate Adviser.

**The Degree of Doctor of Philosophy.** The Department offers programs of study and research leading to the Ph.D. degree. Detailed information may be obtained by writing to the Department Chairperson or the Graduate Adviser.

**Graduate Advisers.** H. Schneider, A.K. Kuhn

## Courses in German

### Lower Division Courses

**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 4 or 6A-6B.

**1. Elementary German (5) I, II, III.** Henderson in charge

Discussion—5 hours; laboratory—two 1/2-hour sessions. 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 student's P/NP option, no petition is required. All other students will receive a letter grade unless a P/NP petition is filed.)

**1H. Elementary Honors German (5) I, II, III.** Henderson in charge

Lecture-discussion—5 hours. Prerequisite: overall high school GPA of 3.5 or GPA of 3.5 in German for students with prior knowledge of German. Accelerated and considerably expanded introduction to German language, short literary texts, and culture accompanied by computer-assisted grammar instruction. Material covered in courses 1H and 2H is the equivalent of that covered in courses 1, 2, and 3.

**2. Elementary German (5) I, II, III.** Henderson in charge

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in areas of grammar and basic language skills.

**2H. Elementary Honors German (5) I, II, III.** Henderson in charge

Lecture-discussion—5 hours. Prerequisite: completion of course 1H with minimum GPA of 3.3 or GPA of 3.5 for incoming students. Completion of the accelerated and expanded first-year program with special emphasis on four skills in a cultural context, literary texts, and computer-assisted grammar instruction.

**3. Elementary German (5) I, II, III.** Henderson in charge

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills through cultural texts.

**4. Intermediate German (4) I, II, III.** Henderson in charge

Recitation—3 hours. Prerequisite: course 3. (Course 4 may be taken concurrently with 6A and/or 6B.) Review of grammatical principles by means of written exercises; expanding of vocabulary through readings of modern texts.

**6A. Spoken German (2) I, II, III.** Henderson in charge

Discussion—2 hours. Prerequisite: course 3. (Courses 4 and 6B may be taken concurrently with or subsequent to 6A.) Conversational practice based on everyday vocabulary of modern spoken German. (P/NP grading only.)

**6B. Spoken German (2) I, II, III.** Henderson in charge

Discussion—2 hours. Prerequisite: course 3. (Courses 4 and 6A may be taken concurrently with 6B.) Conversational practice based on everyday vocabulary of modern spoken German. Topics vary from course 6A. (P/NP grading only.)

**10. Basic Reading German (4) I.** The Staff

Discussion—3 hours; translation project—1 hour. Intensive course for non-majors to provide reading proficiency with texts containing basic sentence patterns and standard general vocabulary. Completion of three-course sequence, 10 and one segment each of 11 (H, N, or S) and 12 (H, N, or S), satisfies College of Letters and Science foreign language requirement. Students who have successfully completed the second or more advanced year of high school level course work in the 10th or higher grade may receive unit credit for this course on a P/NP grading basis only.

**11H, 11N, 11S. Reading German (4) II.** The Staff

Lecture—1 hour; discussion—2 hours; translation project—1 hour. Prerequisite: successful completion of course 10 or the equivalent. Continuation of course 10, with specialized focus for upper division and graduate students in arts and humanities (11H), natural sciences (11N), or social sciences (11S). Reading selections will be appropriately representative. (P/NP grading only.)

**\*12H, 12N, 12S. Advanced Reading German (4) III.** The Staff

Lecture—1 hour; discussion—2 hours; translation projects—1 hour. Prerequisite: successful completion of course 11H, 11N, or 11S. Continuation of course 11H, 11N, or 11S with specialized focus on more advanced texts. Outside reading and translation projects in students' fields of specialization constitute the central element of the course. (P/NP grading only.)

**48. Myth and Saga in the Germanic Cultures (4) I.** Hoermann

Lecture—3 hours; term paper. Knowledge of German not required. Reading in English translation from the Norse Eddas, the Volusng and Sigurd-Siegfried cycles, and the Gudrun lays; literary mythology in German Romanticism culminating in Wagner's "total art-work" concept and *The Ring of the Nibelungs* cycle. May not be counted toward major in German. General Education credit: Civilization and Culture/Introductory.

**50. Survey of German Culture (3) II.** Asman

Lecture—3 hours; term paper. Knowledge of German not required. Characteristic themes in the mainstream of German culture, from medieval intellectual and artistic achievements to the modern period. Study of major trends in arts and literature.

**51. Introduction to Literary Analysis (4) I.** Menges

Lecture—3 hours; discussion—1 hour. Knowledge of German not required. Introductory study of various genres of German literature with emphasis on the interrelationship between form and content and the impact on contemporary literary appreciation.

**\*52. Masterworks of German Literature in English Translation (4) I.** Fetzer, Finney

Lecture—3 hours; papers. Representative masterworks in English translation, beginning with the baroque period of the seventeenth century (treating genres such as drama, comedy, novel, novella, fairy tale, lyric poetry) through the modern epoch. Lec-

tures cover background information on periods, authors, and criticism. General Education credit: Civilization and Culture/introductory.

**98. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5) I, II, III.**

The Staff (Chairperson in charge) (P/NP grading only.)

### Upper Division Courses

**100A. Advanced German Conversation (2) I.**

Bernd

Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

**100B. Advanced German Conversation (2) II.**

Asman

Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

**100C. Advanced German Conversation (2) III.**

Menges

Discussion—2 hours. Prerequisite: course 4. Intensive conversational practice, accurate pronunciation, and language fluency.

**101. Composition and Conversation (4) I, II, III.**

The Staff

Discussion—3 hours; written reports. Prerequisite: course 4 or consent of instructor. Practice in short essay writing. Discussion based on readings from a variety of German texts.

**102. Composition and Conversation (4) I, II, III.**

The Staff

Discussion—3 hours; written reports. Prerequisite: course 101 or consent of instructor. Practice in short essay writing with an aim toward refinement and expansion of vocabulary. Discussion based on readings in a variety of German texts.

**103. Writing Skills in German (4) I, II, III.** The Staff

Lecture—3 hours; term paper. Prerequisite: course 101. Practice in different kinds of writing, such as abstracts, correspondence, lecture summaries, analysis of or response to short literary texts.

**104A. Translation (4) I.** Jillings

Discussion—3 hours; written reports. Prerequisite: course 102 or the equivalent. Exercises in German/English translation using literary and non-literary texts of different styles and linguistic difficulties.

**104B. Advanced Translation (4) II.** Jillings

Discussion—3 hours; written reports. Prerequisite: course 104A or the equivalent. Exercises in German/English translation of literary and non-literary texts.

**105. German Phonology-Morphology (4) I.** Benware

Discussion—3 hours; written or oral report. Prerequisite: course 4; Linguistics 1 recommended. Modern German phonetics and the structure of the phonological system. Elementary morphological analysis.

**106. History of the German Language (4) II.** Benware

Discussion—3 hours; written reports. Prerequisite: course 102; course 105 or Linguistics 1 recommended. Survey of the development of the German language and study of its structure in historical perspective.

**\*107. Modern German Syntax (4) III.** Benware

Discussion—3 hours; term paper. Prerequisite: course 102 or the equivalent or consent of instructor; Linguistics 1 recommended. Examination of the major problems in describing modern German sentence structure.

**\*108. Varieties of Contemporary German (4) III.**

Benware

Lecture—3 hours; laboratory and/or individual/group consultation on projects. Prerequisite: courses 102, 105. Study of relations between Standard language, *Umgangssprachen* and dialects. Approach is both descriptive and sociolinguistic. Class or individual projects on regional differences, including all of the

contiguous German-speaking area of Europe.

**109A. Business German** (4) II. Henderson  
Lecture-discussion—4 hours. Prerequisite: course 101 or consent of instructor. Specialized advanced language course using business-oriented information and publications as the basis for discussions, role-play, reports, compositions and translations.

**109B. Advanced Business German** (3) III.  
Henderson

Lecture—3 hours. Prerequisite: course 109A or consent of instructor. Specialized advanced language course designed as sequel to German 109A. Expands on previously introduced materials and features new topics of interest such as management, computers, and business law.

**\*110. Older German Literature in English** (4) I.  
McConnell

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. Knowledge of German not required. Analyses in English of German literature from the Middle Ages through the Reformation (*Nibelungenlied*, Gottfried's *Tristan und Isolde* or Wolfram's *Parzival*, lyric poetry, selections from Johann von Tepl, Conrad Celtes, Sebastian Brant, Erasmus, Luther). General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**111. Studies of Major Writers from the Seventeenth to the Twentieth Century (in English)** (4) III.  
Asman

Lecture—3 hours; discussion—1 hour; Prerequisite: upper division standing or consent of instructor. Knowledge of German not required. Study of principal works in English translation by one or more major authors such as Grimmelshausen, Lessing, Schiller, Goethe, Heine, Büchner, Hauptmann, Thomas Mann, Brecht, and Kafka. Content will vary each time course is offered.

**111G. Studies in Major Writers from the 17th to the 20th Century** (4) I. Schaeffer

Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Principal works by one or more major authors such as Grimmelshausen, Lessing, Schiller, Goethe, Heine, Büchner, Hauptmann, Thomas Mann, Brecht, Kafka. Content will vary each time course offered. Readings, lectures, discussions in German. May be repeated for credit.

**\*112. Special Topics in German Literature** (4) II.  
The Staff

Discussion—3 hours; written reports. Knowledge of German not required. Analysis of significant themes in German literature; women in literature; the image of America; myths, legends and fairytales; war and social unrest as literary topics; satire and humor in contemporary German literature.

**112G. Special Topics in German Literature** (4) II.  
Schneider

Lecture—3 hours; discussion—1 hour. Prerequisite: course 101. Analysis of significant themes in German Literature: women in literature; the image of America; myths, legends, fairytales; war and social unrest; satire and humor. Readings, lectures, and discussions in German. May be repeated for credit.

**113. Goethe's Faust** (4) II. Bernd

Discussion—3 hours; term paper. Intensive study of one of the great works of world literature: Parts I and II. Discussions and readings in English; reading the text in the original is encouraged. General Education credit: Civilization and Culture/Non-Introductory.

**114. The Faust Tradition Before and After Goethe** (4) I. Fetzer

Lecture—3 hours; term paper. Examines predecessors of Goethe's *Faust* (the German chapbook of 1587, Marlowe's *Tragical History of Dr. Faustus* of 1592), and some successors (Mann's novel of 1947) in order to underscore key variations of this provocative and pervasive theme. Knowledge of German not required.

**115A. German Literature since 1945** (4) I. Menges  
Lecture—3 hours; written reports—1 hour. Knowledge of German not required. Reading of major writ-

ers including the post-war generation of Austria, Switzerland and West Germany. Discussion of novelists like Böll, Grass, Johnson, Walser, Handke; playwrights such as Frisch, Dürrenmatt and Hochhuth, and poets like Celan, Enzensberger, and Aichinger. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4C.

**\*115B. German Literature since 1945** (4) II. Schaeffer

Lecture—3 hours; written reports—1 hour. Knowledge of German not required. Reading and discussion of the literature of the German Democratic Republic (East Germany), the theory of literature in the socialist world, the practice of this literature as exemplified in such authors as Strittmatter, Seghers, Wolf, Kant, Hacks.

**\*116. From Goethe's Werther to Today's Werthers** (4) II. Fetzer

Lecture—3 hours; discussion—1 hour; written reports. Prerequisite: course 51 or 52 recommended. Comparison of Germany's first international best-seller, Goethe's *The Sufferings of Young Werther* (1774) with its later counterparts, culminating in Plenzdorf's novel of 1973 *The New Sufferings of Young W.* General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: German 52.

**117A. The Tristan Tradition: Medieval, Musical, Modern** (4) III. Fetzer

Lecture—3 hours; term paper. Prerequisite: courses 51, 52, and Music 10 recommended. Three different modes of the Tristan and Isolde legend: the medieval epic poem of Gottfried von Strassburg (1210), the music drama of Wagner (1859) and Thomas Mann's parodic novella (1903) in their intellectual environment and interrelationship. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: German 52, Comparative Literature 2, or English 3.

**\*117B. The Nibelungen Tradition: Medieval, Musical, and Modern** (4) III. Fetzer, McConnell

Lecture—3 hours; term paper. Prerequisite: course 51 or 52 or Music 10 recommended. Knowledge of German not required. Three modes of the Nibelungen legend: the Medieval epic poem *Nibelungenlied*, the Scandinavian *Volsunga Saga*, Wagner's music drama *Ring of the Nibelungen*, and Thomas Mann's *Blood of the Walsungs* in their intellectual environment and interrelationship.

**\*118A. Fin-de-siècle Vienna (The Swan Song of the Habsburg Empire)** (4) I. Kuhn

Lecture—1 hour; discussion—2 hours; term paper. Prerequisite: background in European history helpful (e.g., History 147B). 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 in odd-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Comparative Literature 3 or History 4C; History 147B.

**\*118B. Weimar Culture: Defeat, the Roaring Twenties, the Rise of Nazism** (4) II. Kuhn

Lecture—1 hour; discussion—2 hours; term paper. Prerequisite: background in European history helpful (e.g., History 147B). 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 in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Comparative Literature 3 or History 4C; History 147B.

**\*119. From German Fiction to German Film** (4) II.  
Fetzer

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.

**120. Survey of German Culture** (4) III. Fetzer

Discussion—3 hours; written reports. Prerequisite: course 4 or the equivalent. Major developments in such areas of German life as the arts, philosophical thought, social institutions, and political history.

**121. The Medieval Period in German Literature** (4) I. McConnell

Discussion—3 hours; term paper. Prerequisite: course 101. Literary-philosophical profile of the *Mittelhochdeutsche Blütezeit* in terms of the significant epics, romances, and lyric poetry, Readings in modern German.

**\*122. German Literature from Humanism to Baroque** (4) I. Schaeffer

Lecture—3 hours; written reports. Prerequisite: course 101. Exemplary literary works of the sixteenth and seventeenth centuries tracing the principal lines of development and showing the reflection in literature of the social scene.

**123. Literature of the Classical Age** (4) I. Schneider

Discussion—3 hours; written or oral reports. Prerequisite: course 101. A critical assessment of principal works of Goethe and Schiller in their development from *Sturm und Drang* individualism and rebellion to the balanced harmony of the classical period.

**\*125. Short Fiction Around 1900** (4) II. Schaeffer

Lecture—3 hours; term paper. Prerequisite: course 101. Representative short German fiction in the fin-de-siècle period, to attain conversance with various prose styles and the cultural currents they reflect.

**126. Modern German Literature** (4) II. Menges

Discussion—3 hours; written reports. Prerequisite: course 101. Selections from the significant works of major twentieth-century writers, such as Hesse, Mann, Kafka, Rilke, Brecht, Grass. May be repeated for credit with consent of Undergraduate Major Adviser.

**129. Postwar Women Writers** (4) III. Finney

Discussion—3 hours; term paper. Prerequisite: course 101. Survey of major women writing in German since 1945. Considers such issues as the existence of "feminine writing" and of a feminist aesthetics. Writers include Seghers, Bachmann, Wolf, Kirsch, Morgner, Wohmann, Stefan, and Schwaiger.

**131. German Lyric Poetry** (4) III. Schneider

Lecture—3 hours; term paper. Prerequisite: course 101. Study of the genre of lyric poetry from late Middle Ages through Renaissance, Baroque, Classical, Romantic, and Modern periods in correlation with other literary forms and the social climate of each period.

**132. The German Novelle** (4) I. Bernd

Lecture—3 hours; written reports. Prerequisite: course 101. Inquiry into the art of the "Novelle" through analysis of the materials and formal devices of representative authors from Goethe to Kafka.

**\*133. The German Drama** (4) III. Fetzer

Lecture—3 hours; written reports. Prerequisite: course 101. Readings in the works of Germany's leading dramatists from the seventeenth century to the present day, such as Lessing, Goethe, Schiller, Kleist, Hebbel, Hauptmann, Brecht.

**\*140. German Political Literature from the Middle Ages to the Present** (4) II. McConnell

Lecture—3 hours; discussion—1 hour. Prerequisite: English 3 or 4, or French 25; course 51 recommended. Examination of the relationship of art to politics in German literary history from the time of Walther von der Vogelweide in the Middle Ages, through the Reformation, the period of Romanticism, and the Twentieth Century. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: English 3 or 4. Offered in even-numbered years.

**192. Field Work in German** (1-12) I, II, III. Henderson  
Internship—3-36 hours. Prerequisite: course 109A. Internship with several German companies. Participation in various business activities where expertise in German is expected and further developed. (P/NP grading only.)

**194H. Special Study for Honors Students** (5) I, II, III. The Staff

Prerequisite: open only to honors students. Guided research leading to an honors paper.

**197T. Tutoring German (2-4)** I. Henderson

Lecture—2-4 hours; term paper. Prerequisite: course 102 or consent of instructor. Tutoring and leading of special discussion sections in first-year language classes. Offers teaching opportunities under guidance of staff after initial observation period. Exposes course participants to all phases of language teaching; instant feedback and discussion. (P/NP grading only.)

**198. Directed Group Study (1-5)** I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)** I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

**Graduate Courses**

**200A. German Colloquium Series (2)** I. The Staff

Lecture-discussion—2 hours. A literary colloquium designed to help students prepare for the M.A. Examination. Review of texts based on the M.A. Reading List (Middle Ages to 1790), including pertinent bibliographies and other research tools. Required of M.A. candidates. (S/U grading only.)

**200B. German Colloquium Series (2)** II. The Staff

Lecture-discussion—2 hours. A literary colloquium designed to help students prepare for the M.A. Examination. Review of texts based on the M.A. Reading List (1790-1900), including pertinent bibliographies and other research tools. Required of M.A. candidates. (S/U grading only.)

**200C. German Colloquium Series (2)** III. The Staff

Lecture-discussion—2 hours. A literary colloquium designed to help students prepare for the M.A. Examination. Review of texts based on the M.A. Reading List (1900 to present), including pertinent bibliographies and other research tools. Required of M.A. candidates. (S/U grading only.)

**\*202. Middle High German (4)** II. Benware

Discussion—3 hours; lecture—1 hour. Outline of grammar; selections from Middle High German epic, romance, and lyric poetry.

**\*209. Literary Stylistics (4)** I. Schaeffer

Seminar—3 hours; written reports. History and meanings of style; levels of diction; analysis of current literary and critical styles. Practice in writing book reviews, articles, lectures and other papers.

**\*210. Techniques of Literary Scholarship (4)** I. Fetzer

Seminar—3 hours; term paper. The bibliographical, organizational, and methodological tools and resources for advanced, independent research.

**211. Concepts in Literary Theory (4)** II. Schneider

Seminar—3 hours; written reports. 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.

**\*212. Contemporary Approaches to Literary Theory (4)** III. Finney

Seminar—3 hours; term paper. Study of contemporary theoretical approaches such as structuralism, deconstruction, feminism, Marxism/Frankfurt School, and reception theory in conjunction with the works of major authors.

**240. Forms of German Verse (4)** II. Bernd

Seminar—3 hours; term paper. The development of German verse from the Middle Ages to Gottfried Benn, with special emphasis on different techniques of text analysis and interpretation. May be repeated for credit with consent of instructor.

**\*241. The German Drama (4)** I. Finney

Seminar—3 hours; term paper. 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.

**\*242. The German Novelle (4)** II. Bernd

Seminar—3 hours; term paper. 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.

**\*243. Fontane and the Rise of the Modern German Novel (4)** II. Bernd

Seminar—3 hours; term paper. 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.

**\*252. The Writings of Lessing (4)** I. Sammern-Frankenegg

Seminar—3 hours; term paper. Study of Lessing's theory of literature with particular emphasis upon his critical attacks on French drama.

**\*253. Goethe (4)** II. The Staff

Seminar—3 hours; term paper. Study of the origins of Goethe's thought in German Pietism, and his principal artistic, autobiographical, scientific, and philosophical works.

**\*254. Schiller (4)** III. The Staff

Seminar—3 hours; term paper. 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.

**\*257. Heinrich von Kleist (4)** III. Bernd

Seminar—3 hours; term paper. Kleist's important dramatic and prose works; special attention will be given to the peculiar hermeneutic problems in modern German, French, and Anglo-American Kleist criticism.

**\*258. The Novels of Thomas Mann (4)** II. Menges

Seminar—3 hours; term paper. Reading of selected novels with emphasis on aesthetic techniques, originality, ethical and political views, and influence on the contemporary literary scene in Germany.

**259. Studies in Kafka (4)** II. Hoermann

Seminar—3 hours; term paper. Study of Kafka's narrative techniques with special emphasis in the shorter works on the existential development from its roots in expressionism.

**\*260. The Poetry of Rilke (4)** I. Menges

Seminar—3 hours; term paper. Study of the principal motifs, myths, images, and problems in the poetry of Rainer Maria Rilke.

**261. Brecht and the Epic Theater (4)** III. Menges

Seminar—3 hours; term paper. A reading of Brecht's works with emphasis on the ideas which impelled the development of new literary forms and concepts.

**270A. Research in a Period or Topic (4)** I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour; term paper. Individually guided research, under the supervision of a faculty member, in the specialized study of a period or problem that holds promise of yielding dissertation topics, culminating in a term paper. Recommended for Ph.D. candidates prior to the Qualifying Examination.

**270B. Basic Research for the Dissertation (4)** I, II, III. The Staff (Chairperson in charge)

Individual instruction from a faculty member—1 hour. Prerequisite: course 270A. Individually guided intensive research, under the supervision of a faculty member, designed to develop expertise and generate basic materials (such as a detailed outline and bibliography) for the dissertation topic. Required for Ph.D. candidates prior to the Qualifying Examination.

**270C. Basic Research for the Dissertation (4)** I, II, III. The Staff (Chairperson in charge)

Individual instruction from a faculty member—1 hour. Prerequisite: course 270B. Individually guided intensive research, under the supervision of a faculty member, designed to develop expertise and generate basic materials (such as a detailed outline and bibliography) for the dissertation topic. Required for Ph.D. candidates prior to the Qualifying Examination.

**285. Middle High German Literature (4)** III. Jillings

Seminar—3 hours; term paper. Prerequisite: course 202 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 with change of subject matter and consent of instructor.

**\*288. The Renaissance and Reformation in German Literature (4)** I. Schaeffer

Seminar—3 hours; term paper. The parabolic and didactic style in Germany's literature during the sixteenth century. May be repeated for credit with consent of instructor.

**\*289. German Literature of the Baroque (4)** I. Schaeffer

Seminar—3 hours; term paper. The "Elegantiadeal" and the varying methods used to portray it in seventeenth-century German literature. May be repeated for credit with consent of instructor.

**290. The Enlightenment in German Literature (4)** I. Borchmeyer

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.

**\*292. Sentimentality and "Sturm und Drang" in German Literature (4)** III. The Staff

Seminar—3 hours; written reports. 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.

**293. The Classical Age of German Literature (4)** III. Asman

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.

**\*294. The Romantic Period in German Literature (4)** III. Fetzer

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.

**\*295. Poetic Realism in German Literature (4)** I. Bernd

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.

**\*296. Twentieth-Century German Literature (4)** I. Kuhn

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.

**297. Special Topics in German Literature (4)** I, II, III. The Staff

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)** I, II, III. The Staff (Chairperson in charge)

**299. Individual Study (1-12)** I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

**299D. Special Study for the Doctoral Dissertation (1-12)** I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

**Professional Courses**

**390A. The Teaching of German (2)** I. Henderson

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.)

**390B. The Teaching of German (2)** II. Henderson

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.)

**390C. The Teaching of German (2)** III. Henderson

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.)

**400. Tutorial and Instructional Internship (1-3) I, II, III.** The Staff (Chairperson in charge)

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.

cal problems, and presenting conclusions with clarity and logic. The Department thus can give basic support to the education of all undergraduates, whatever their major.

History is also a practical major if one is considering a professional career such as teaching, law, journalism, public administration, or business management. Professional schools in these and related fields 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 many history classes, and their mastery gives the history student a solid preparation for subsequent training in a specialized career.

A student electing a major in History may complete Plan I, Plan II, or Plan III. *Plan I* enables students to concentrate chiefly on the history of one geographic area or time period of their choosing. The purpose of *Plan II* is to encourage 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 history as part of the major. Students preferring more active engagement in research and writing are encouraged to follow Plan II. The purpose of *Plan III* is to enable students to study in depth the field of twentieth-century history, whose common problems of political conflict, social development, and cultural creativity cut across the several geographical fields of concentration which the department now offers.

**A.B. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter (Plans I, II, and III)</b>	<b>20</b>

Five lower division courses, including at least two from each of two of the following fields.....20

- a. Western Civilization: History 4A, 4B, 4C, 1, 2, 3, 10, 30
- b. Asian Civilization: History 8, 9A, 9B, 90A
- c. United States and Latin America: History 17A, 17B, 17C, 22, 72A, 72B, 85, 86
- d. Africa: History 15

**Depth Subject Matter—Plan I.....40-41**

At least six upper division courses from one of the fields of concentration\* listed below. Include a two-quarter sequence of courses.....24

At least three upper division courses from one of the other fields listed.....12

At least one course from the following: History 101, or 102 (in field of concentration), or 103 (in field of concentration).....4-5

**Total Units for the Major, Plan I.....60-61**

**Depth Subject Matter—Plan II.....42**

At least four upper division courses from one of the fields of concentration listed below. Include a two-quarter sequence of courses.....16

At least three upper division courses from one of the other fields listed.....12

History 101 .....5

History 102 in field of concentration .....5

History 103 in field of concentration .....4

**Total Units for the Major, Plan II.....62**

**Depth Subject Matter—Plan III.....41**

History 146A, 146B, 174B, 174C .....16

At least three upper division courses chosen from the following list of twentieth-century courses, classified by area of concentration. At least one course must be from category A .....12

- A. Asia and Latin America: History 161B, 163B, 165, 166B, 168, 190C, 193, 194C, 194D, 194E, 195, 196B

- B. United States: History 169B, 174A, 174D, 175C, 176B, 177B, 179, 180C,

185B, 187B, 188B, 189C

C. Europe: History 137C, 138, 141, 142, 143, 144, 147B, 147C, 150, 151D, 155A, 155B, 155C

History 102, on a topic in twentieth-century history (normally chosen from sections E, F, H, I, J, M, N, or O) .....5

Two additional upper division history courses selected from courses within a single field of study (e.g., Europe, United States, Africa, Latin America, Asia) which do not cover twentieth-century history .....8

**Total Units for the Major, Plan III.....61**

**Fields of Concentration\***

a. European History: History 102A, 102B,

102C, 102D, 102E, 102F, 102I, 102P, 111A, 111B, 111C, 121A, 121B, 121C, 122, 130A, 130B, 130C, 131A, 131B, 131C, 132, 133, 134A, 134B, 137A, 137B, 137C, 138, 140, 141, 142, 143, 144, 145, 146A, 146B, 147A, 147B, 147C, 148A, 148B, 149, 150, 151A, 151B, 151C, 151D, 154, 155A, 155B, 155C.

b. United States History: History 102K, 102L, 102M, 169A, 169B, 170A, 170B, 170C, 171A, 171B, 173A, 173B, 173C, 174A, 174B, 174C, 174D, 175A, 175B, 175C, 176A, 176B, 177A, 177B, 178, 179, 180A, 180B, 180C, 181, 183A, 183B, 185A, 185B, 187A, 187B, 188A, 188B, 189A, 189B, 189C.

c. Asian History: History 102G, 102H, 102N, 102Q, 102R, 190A, 190B, 190C, 191A, 191B, 193, 194A, 194B, 194C, 194D, 195, 196A, 196B.

d. African History: History 102O, 115A, 115B, 115C, 116.

e. Latin American History: History 102J, 161A, 161B, 162, 163A, 163B, 165, 166A, 166B, 168, 169A, 169B.

f. A student may group courses from two related fields, (a) through (e) above, to make a field of concentration when there are not enough courses in one particular area of study. Approved groupings include: Africa and Europe, Africa and Latin America, Africa and the United States. For other groupings, or to meet special needs, a student should obtain written approval from an adviser. 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.

**Recommended**

Completion of all three courses in Western Civilization (i.e., History 4A, 4B, 4C) and one or two courses (normally a two-quarter sequence) in one of the following fields: Asian American studies, classics, cultural anthropology, cultural geography, principles of economics, English literature, literature of the United States, philosophy, political science, psychology, sociology, or statistics.

**Major Advisers.** C.L. Brantley, D.H. Calhoun, R.O. Crumme, P.F. Findlen, M.P. Fleischer, D.L. Jacobson, E.H. Kinmonth, C.J. Kudlick, N.B. Landau, T.W. Margadant, B. Metcalf, D.C. Price, R.E. Rosen, M. Rothstein, V.L. Ruiz, R.N. Schwab, M.B. Sherwood, M. Smith, S. Spyridakis, C.E. Walker.

**Minor Program Requirements:**

History units may be taken in a single field of concentration, such as Africa, East Asia, Europe, Latin America or the United States. Alternatively, students may select a minor with a thematic emphasis, as listed below, or design a thematic minor in consultation with a Department adviser.

## Greek

### See Classics

## Hebrew

### See Religious Studies

## History

(College of Letters and Science)

Roland Marchand, Ph.D., Chairperson of the Department  
Department Office, 176 Voorhies Hall (916-752-0776)

### Faculty

Arnold J. Bauer, Ph.D., Professor  
William M. Bowsky, Ph.D., Professor  
Cynthia L. Brantley, Ph.D., Associate Professor  
David Brody, Ph.D., Professor  
Daniel R. Brower, Jr., Ph.D., Professor  
Daniel H. Calhoun, Ph.D., Professor  
Robert O. Crumme, Ph.D., Professor  
Paula E. Findlen, Ph.D., Assistant Professor  
Manfred P. Fleischer, Ph.D., Professor  
Paul Goodman, Ph.D., Professor  
William W. Hagen, Ph.D., Professor  
W. Turrentine Jackson, Ph.D., Professor Emeritus  
David L. Jacobson, Ph.D., Professor  
Phyllis G. Jestice, Ph.D., Assistant Professor  
Earl H. Kinmonth, Ph.D., Professor  
Catherine J. Kudlick, Ph.D., Assistant Professor  
Norma B. Landau, Ph.D., Professor  
Kwang-Ching Liu, Ph.D., Professor  
Eugene Lunn, Ph.D., Professor  
Susan L. Mann, Ph.D., Professor  
C. Roland Marchand, Ph.D., Professor  
Ted W. Margadant, Ph.D., Professor  
Barbara Metcalf, Ph.D., Professor  
Rolle E. Poppino, Ph.D., Professor  
Don C. Price, Ph.D., Professor  
Ruth E. Rosen, Ph.D., Professor  
Morton Rothstein, Ph.D., Professor  
Vicki L. Ruiz, Ph.D., Associate Professor  
Richard N. Schwab, Ph.D., Professor  
Morgan B. Sherwood, Ph.D., Professor  
James H. Shideler, Ph.D., Professor Emeritus  
Michael Smith, Ph.D., Associate Professor  
Wilson Smith, Ph.D., Professor Emeritus  
Stylianos Spyridakis, Ph.D., Professor  
Clarence E. Walker, Ph.D., Professor  
F. Roy Willis, Ph.D., Professor

### The Major Program

This major is designed to develop critical intelligence and to foster an understanding of ourselves and our world through the study of the past—both remote and recent. The Department offers a variety of approaches to history, each emphasizing basic disciplinary skills: weighing evidence, analyzing histori-

UNITS	
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**History** ..... At least 20 units of upper division history courses.....

20

Examples of minor with thematic emphasis:

- a. Pre-Law (British and American Political and Constitutional Development)—twenty units chosen from History 151A, 151B, 151C, 170B, 180A, 180B, 180C, 102I or 102L (with approval of adviser).
- b. The Twentieth Century—twenty units selected from History 146A, 146B, 174B, 174C (at least 8 of the units); 102E, 102F, 102H, 102I, 102J, 102M, 102N, or 102O, 116, 137C, 141, 142, 143, 144, 147B, 147C, 151D, 161B, 163B, 165, 166B, 168, 169B, 173C, 174C, 175C, 176B, 177B, 179, 180C, 185B, 188B, 189C, 190C, 193, 194C, 195, 196.
- c. The History of Ideas in Society—twenty units selected from History 101, 102A-P (with approval of adviser), 130A, 130B, 130C, 132, 133, 134A, 134B, 147A, 147B, 147C, 148A, 148B, 150, 175A, 175B, 175C, 177A, 177B, 179, 185A, 185B, 191A, 191B, 194B.

**Minor Advisers.** Same as for major advisers.

**Honors and Honors Program.** A student may become eligible for graduation with high or highest honors by meeting the minimum grade-point average and course work requirements established by the College of Letters and Science and by demonstrating unusually imaginative or creative work in history (see the College of Letters and Science section of this catalog). Such creative work may be demonstrated in various ways: in undergraduate seminars, in independent study, in special projects, or by distinguished work in Plan II of the major program. Departmental recommendation, based on clear evidence of distinction and originality, is a prerequisite for the awarding of high or highest honors.

**Teaching Credential Subject Representative.** D.L. Jacobson. See also the section on the Teacher Education Program.

**Waiver Program for Single-Subject Teaching Credential in History.** The Department of History offers a program of study for students seeking a secondary teaching credential in history. The program consists of 45 course units, including courses 17A and 17B, two lower division courses in Western Civilization (1, 3, 4A, 4B, 4C) of which one must be 3 or 4C, one undergraduate seminar (course 101 or 102), and six additional courses, of which four must be at the upper division level. Successful completion of this program will allow the student to receive a waiver from examinations for the History Single-Subject Teaching Credential.

**Education at Home Program (EHP).** In the Winter Quarter of 1990, the UCR campus will continue the Education at Home Program for those students with special interest in early American history and culture. Those selected for participation in this program will spend nine weeks in Williamsburg, one in Philadelphia, and a concluding week in Washington, D.C. *This program is open to all undergraduates from any campus in the UC system.* With prior approval of their graduate adviser, graduate students may also apply.

Registration (through the Riverside campus) will be made for the following three courses in the Department of History: 157, 158, and 159. Special arrangements for additional independent study (maximum of 4 units) may be made with the student's home campus. For further information, brochures or application forms, telephone Riverside campus, (714) 787-3820. Preference is given to applications received by June 30; the final application deadline is November 1.

**Graduate Study.** The Department of History offers programs of study and research leading to the M.A., M.A.T., and Ph.D. degrees in history. Detailed information may be obtained by writing to the Graduate Adviser, Department of History.

**Graduate Advisers.** A.J. Bauer, W.M. Bowsky, D.H. Calhoun, P. Goodman, K.C. Liu, E. Lunn, T.W. Margadant.

**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, 174A, 174B, 174C, 175A, 175B, 175C, 176A, 176B, 177A, 177B, 179, 180A, 180B, 183A, 183B. The upper division courses may be used only with the consent of the instructor. (See also under University requirements.)

## Courses in History

### Lower Division Courses

#### 1. The Bible and Ancient History (4) II. Schwab

Lecture—3 hours; discussion—1 hour. Examination of the Judaeo-Christian tradition as it met ancient Near Eastern and classical ideas and institutions through New Testament times. Emphasis on the Bible as a historical document and on historical-critical interpretation of scriptures.

#### 2. Ancient Civilizations (4) III. Fleischer

Lecture—3 hours; discussion—1 hour. Growth of ancient civilizations from the Sumerians to the Fall of the Roman Empire.

#### 3. Cities: A Survey of Western Civilization (4) II. Willis

Lecture—3 hours; discussion—1 hour. Survey of western civilization, focusing on nine cities, at the period of their greatest creativity: Athens, Rome, Constantinople, Paris, Florence, Amsterdam, London, Berlin, Moscow. Illustrated with slides, music, and optional films. General Education credit: Civilization and Culture/Introductory.

#### 4A. History of Western Civilization (4) I, III. The Staff (Chairperson in charge)

Lecture—3 hours; discussion—1 hour. Growth of western civilization from late antiquity to the Renaissance. General Education credit: Civilization and Culture/Introductory. (CAN Hist Seq A)

#### 4B. History of Western Civilization (4) I, II. The Staff (Chairperson in charge)

Lecture—3 hours; discussion—1 hour. Development of western civilization from the Renaissance to the Eighteenth Century. General Education credit: Civilization and Culture/Introductory. (CAN Hist Seq A)

#### 4C. History of Western Civilization (4) II, III. The Staff (Chairperson in charge)

Lecture—3 hours; discussion—1 hour. Development of Western Civilization from the Eighteenth Century to the present. General Education credit: Civilization and Culture/Introductory. (CAN Hist Seq A)

#### 8. History of Indian Civilization (4) I. Metcalf

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. General Education credit: Civilization and Culture/Introductory.

#### 9A. History of East Asian Civilization (4) I, III. The Staff

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. General Education credit: Civilization and Culture/Introductory.

#### 9B. History of East Asian Civilization (4) II. Kinmonth

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.

#### 10. World History of the Twentieth Century (4) I. Brower

Lecture—3 hours; discussion—1 hour. History of the world in the twentieth century, emphasizing major powers and their leaders (Wilson, Lenin, Hitler, Roosevelt, Stalin, Mao, Nehru, Nasser, Castro). General Education credit: Contemporary Societies/Introductory.

#### \*15. Introduction to African History (4) I. Brantley

Lecture—3 hours; term paper. Examination of the long-range historical context as background to current conditions in Africa. This survey includes the early development of African civilizations through the twentieth-century colonization by Europeans.

#### 17A. History of the United States (4) I, II, III. The Staff

Lecture—3 hours; discussion—1 hour. Growth of the American people from Colonial times to 1815. General Education credit: Civilization and Culture/Introductory.

#### 17B. History of the United States (4) I, II, III. The Staff

Lecture—3 hours; discussion—1 hour. Growth of the American people from 1815 to 1915. General Education credit: Civilization and Culture/Introductory.

#### 17C. History of the United States (4) I, II, III. The Staff

Lecture—3 hours; discussion—1 hour. Growth of the American people from 1915 to the present.

#### 22. Violence and Law in America (4) III. Calhoun

Lecture—2 hours; discussion—2 hours. Movements of protest or social control from the revolutionary period to the present. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: History 4C, 17A, 17B, or Political Science 1.

#### 25. Thematic History Seminar (4) II. The Staff

Seminar—3 hours; term paper. Prerequisite: freshman or sophomore standing. Explores in-depth a historical topic related to the research interests of the instructor. Addresses historical questions, controversies, methodology, and interpretations.

#### \*30. Russian Cultural History (4) III. Crumney

Lecture—3 hours; discussion—1 hour. Survey of Russia's history over the last thousand years as reflected in the lives of her political leaders, artists, and rebels. Lectures will use the biographies of Russian political leaders, intellectuals and artists to illustrate the general currents of the country's political, social, and cultural development. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4B or 4C.

#### 72A. Social History of American Women and the Family (4) II. Rosen

Lecture—3 hours; discussion—1 hour. Social and cultural history of women, sex roles and the family from colonial America until the late nineteenth century emphasizing changes resulting from the secularization, commercialization, and industrialization of American society. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 17A.

#### 72B. Social History of American Women and the Family (4) III. Rosen

Lecture—3 hours; discussion—1 hour. Social and cultural history of women, sex roles, and the family in twentieth-century America, emphasizing female reformers and revolutionaries, working class women, consumerism, the role of media, the "feminine mystique," changes in family life, and the emergent women's movement.

#### \*85. Nature, Man, and the Machine in America (4) III. Sherwood

Seminar—4 hours; term paper. Prerequisite: consent of instructor. History of the attitudes and behavior of Americans toward their natural environment and their technology, from colonial times to the present. No final examination. Limited enrollment.

#### 86. Quackery and Pseudoscience in America (4) I. Sherwood

Lecture—3 hours; tutorial supervision of research paper. History of humbug and pseudoscience in

America: witchcraft, medical quackery, spiritualism, science hoaxes, technological frauds, literary and artistic forgeries, UFOs, pyramidology, astrology, psychic phenomena. Emphasis upon explanations for the existence of deception and pseudoscience.

**\*90A. Modernization of China** (4) II. The Staff  
Lecture-discussion—4 hours; written reports. Reading and discussion of aspects of modern China. Background on the contemporary scene is stressed.

**98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only)

### Upper Division Courses

**101. Introduction to Historical Thought and Writing** (5) III. Landau

Lecture-discussion—4 hours; term paper. Prerequisite: consent of instructor. 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.

**102A-R. X. Undergraduate Proseminar in History** (5) I, II, III. The Staff

Seminar—3 hours; term paper. Designed primarily for history majors. Intensive reading, discussion, research, and writing in selected topics in the various fields of history. (A) Ancient; (B) Medieval; (C) Renaissance and Reformation; (D) Modern Europe to 1815; (E) Europe since 1815; (F) Russia; (G) China to 1800; (H) China since 1800; (I) Britain; (J) Latin America since 1810; (K) American History to 1787; (L) United States, 1787-1896; (M) United States since 1896; (N) Japan; (O) Africa; (P) Christianity and Culture in Europe, 50-1850; (Q) India; (R) Muslim Societies; (X) 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. Limited enrollment.

**103. Topics in Historical Research** I, II, III. The Staff (Chairperson in charge)

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.

**\*111A. Ancient History** (4) I. Spyridakis

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.

**111B. Ancient History** (4) II. Spyridakis

Lecture—3 hours; discussion or paper (student option). Political, cultural and intellectual study of Greek world from Minoan-Mycenaean period to end of Hellenistic Age.

**111C. Ancient History** (4) III. Spyridakis

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.

**115A. History of West Africa** (4) III. Brantley

Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 4C recommended. Introductory survey of the history of West Africa and the Congo region from the earliest times to the present.

**115B. History of East and Central Africa** (4) II. Brantley

Lecture—3 hours; written reports. Prerequisite: course 115A recommended. Introductory survey of the history of east and central Africa from 1000 to the present. This course is a part of an interdisciplinary East African sequence which includes History 115B (winter) and Political Science 138.

**115C. History of Southern Africa, Swaziland, Lesotho, and Botswana from 1500 to the Present** (4) I. Brantley

Lecture—3 hours; written reports. Prerequisite:

courses 115A and 115B recommended. Introductory survey of the history of Southern Africa, including South Africa, Swaziland, Lesotho, and Botswana from 1500 to the present.

**\*116. African History: Special Themes** (4) III. Brantley

Lecture—3 hours; term paper. Prerequisite: courses 115A and 115B 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.

**121A. Medieval History** (4) I. Bowsky

Lecture-discussion and panel presentations—3 hours. European history from "the fall of the Roman Empire" to the eighth century.

**121B. Medieval History** (4) II. The Staff

Lecture-discussion and panel presentations—3 hours. European history from Charlemagne to the twelfth century.

**121C. Medieval History** (4) III. Bowsky

Lecture-discussion and panel presentations—3 hours. European history from the Crusades to the Renaissance.

**122. Selected Themes in Medieval History** (4) II. Bowsky

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.

**130A. Christianity and Culture in Europe: 50-1450**

(4) I. Fleischer

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.

**130B. Christianity and Culture in Europe: 1450-1600**

(4) II. Fleischer

Lecture—3 hours; written report or research paper. A history of the Lutheran, Zwinglian-Calvinist, Radical, Anglican, and Catholic Reformations 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.

**\*130C. Christianity and Culture in Europe: 1600-1850**

(4) III. Fleischer

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.

**\*131A. Early Modern European History** (4) I. Fleischer

Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B recommended. Western European history from about 1350 to about 1500.

**\*131B. Early Modern European History** (4) II. Fleischer

Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 131A recommended. Western European history from about 1500 to about 1650.

**\*131C. Early Modern European History** (4) III. Fleischer

Lecture—3 hours; written reports. Prerequisite: courses 4A, 4B, 131B recommended. Western European history from about 1650 to about 1789.

**132. The Scientific Revolution** (4) III. Findlen

Lecture—3 hours; term paper. History of science in Western Europe (1400-1750). Investigates the changing definitions of science in the age of Copernicus, Vesalius, Harvey, Galileo and Newton. Considers the evolution of new ideas about nature, experiment, observation, and scientific theory.

**133. The Age of Ideas** (4) II. Schwab

Lecture—3 hours; written reports. The Enlightenment and its background in the seventeenth century.

**134A. The Age of Revolution** (4) III. Schwab

Lecture—3 hours; written reports. Ideas and institu-

tions during the French Revolution and the Napoleonic era.

**\*134B. The Age of Revolution** (4) III. Schwab

Lecture—3 hours; written reports. Ideas and revolution after 1815. Offered in odd-numbered years.

**\*137A. Russian History: Kievan, Muscovite, and Petrine** (4) I. Crumney

Lecture—3 hours; term paper. Russian civilization from early times to 1725. Emphasis on the rise of autocracy and the evolution of society and culture.

**\*137B. Russian History: The Empire, 1725-1900**

(4) II. Brower

Lecture—3 hours; term paper. Russian civilization from the Petrine reforms to the end of the nineteenth century. Emphasis on the strengthening and reform of the autocracy, the rise of movements for revolutionary change, and the evolution of society and culture.

**137C. Revolutionary and Soviet Russia, 1900 to the Present** (4) III. Brower

Lecture—3 hours; written reports. Evolution of the Russian state and society from the collapse of tsarist Russia through the creation and consolidation of the new Soviet order.

**\*138. History of the Russian Revolution** (4) II. Brower

Lecture—3 hours; term paper and oral reports. History of the fall of the Russian autocracy and of the Revolution of 1917. Offered in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 3, 4C, or 10.

**\*140. The Rise of Capitalism in Europe** (4) III. Hagen

Lecture—3 hours; term paper. Prerequisite: course 4B or 4C. 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 in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4A, 4B, or 4C.

**141. France Since 1815** (4) II. Margadant

Lecture—3 hours; term paper.

**142. Why the Holocaust?** (4) II. Goodman

Lecture—3 hours; term paper. Long- and short-term causes of the Holocaust; the emancipation of European Jewry; the rise of modern antisemitism; nationality question in central Europe; antisemitism and German politics; Naziism and mass murder; responses by victims and bystanders.

**143. History of Eastern Europe and the Balkans**

(4) II. Hagen

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.

**144. History of Germany since 1648** (4) II. Hagen

Lecture—3 hours; essays. Social and political history of Germany in the ages of absolutism and the Enlightenment, industrialization and national unification, the World Wars, and since 1945.

**145. War and Revolution in Europe, 1789-1918** (4) III. Margadant

Lecture—3 hours; term paper. Survey of revolutionary movements, international crises, and wars in Europe from the French Revolution to World War I.

**146A. Europe in the Twentieth Century** (4) I. Willis

Lecture—3 hours; term paper. Survey of the history of Europe from 1919 to 1939.

**146B. Europe in the Twentieth Century** (4) III. Willis

Lecture—3 hours; term paper. Survey of the history of Europe since 1939.

**147A. European Intellectual History, 1800-1870** (4) I. Lunn

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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4C or Philosophy 151.

**147B. European Intellectual History, 1870-1920 (4)**

II. Lunn

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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4C or Philosophy 151.

**147C. European Intellectual History, 1920-1970 (4)**

III. Lunn

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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4C.

**148A. Women and Society in Europe: 1500-1789 (4) I, II, III. Kudlick**

Lecture—3 hours; term paper. Prerequisite: course 4B recommended. 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.

**148B. Women and Society in Europe: 1789-1920 (4) I, II, III. Kudlick**

Lecture—3 hours; term paper. Prerequisite: course 4C, 148A recommended. 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.

**\*149. Workers and Politics in Industrial Societies: A Comparative Historical Approach (4) III. Goodman**

Lecture—4 hours. Comparative analysis of the development of labor parties and socialist movements in Britain, France, Germany and their failure in the United States in the nineteenth and early twentieth centuries. Political cultures, social structures, and historical experiences shaping working-class politics.

**\*150. Ethnic Conflict and Anti-Semitism in Modern Europe (4) I. Hagen**

Lecture—3 hours; term paper. Prerequisite: course 4C. Historical dynamics of ethnic conflict and radical nationalism in nineteenth- and twentieth-century Europe. Focusing on selected examples (e.g., the Habsburg Empire; the Celtic lands; forms and functions of anti-Semitism; interpretations and consequences of the Holocaust). Offered in even-numbered years.

**\*151A. England: The Middle Ages (4) II. The Staff**

Lecture—3 hours; term paper. Prerequisite: course 4A recommended. 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.

**\*151B. England: The Early Modern Centuries (4) II.**

Lecture—3 hours; term paper. Prerequisite: courses 4A, 4B; course 151A recommended. 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.

**151C. Eighteenth-Century England (4) I. Landau**

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.

**\*151D. Industrial England (4) III. Landau**

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 Bloomsbury, empire to commonwealth.

**\*154. Tudor and Stuart England (5) III.**

Seminar—3 hours; reports and research paper. Prerequisite: courses 151A, 151B and/or consent of instructor. Intensive investigation of selected aspects of Tudor and Stuart history; emphasis on social problems and the arts and learning.

**\*155A. British Foreign Policy Since 1920: The End of the British Empire (4) I. Freeman**

Lecture—3 hours; term paper. Prerequisite: upper division standing. How and why Britain passed so rapidly and by constitutional process from being the greatest imperial power in history to non-imperial, middle-grade status; the background against which the global responsibilities of the U.S. developed with equal rapidity.

**\*155B. British Foreign Policy Since 1920: Britain's Relations with the U.S. and the U.S.S.R. (4) II. Freeman**

Lecture—3 hours; term paper. Prerequisite: upper division standing. Britain's supposedly intimate relation with the U.S.; its modification with changes in power-structure and with Britain's EEC membership; the effect on relations with the U.S. of Britain's (and other NATO powers') efforts to achieve independent relations with the U.S.S.R.

**\*155C. British Foreign Policy Since 1920: Britain and Europe (4) III. Freeman**

Lecture—3 hours; term paper. Prerequisite: upper division standing. Britain's attempts after 1920 to replace the European balance of power with collective security and then, briefly after World War II, with British hegemony in Europe. Britain's final, contentious entry to the EEC and its consequences for western Europe.

**161A. Latin American History (4) I. Bauer**

Lecture-discussion—3 hours; written reports. Pre-Columbian civilizations of Middle America and the Andean region (mainly Aztec and Inca); the impact of European conquest and colonization; the formation of a hybrid culture. Extensive use of photographic slides. General Education credit: Civilization and Culture/Introductory

**161B. Latin American History (4) II. Bauer**

Lecture-discussion—3 hours; written reports. Evolution of modern Latin America: export economies; oligarchic rule; reform and revolution; the difficulties of the twentieth century. Emphasis on Mexico, Cuba, the Andean region, Chile, and Argentina. Photographic slides.

**\*162. History of the Andean Region (4) III. Bauer**

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.

**163A. History of Brazil (4) III. Poppino**

Lecture—3 hours; written reports. The history of colonial and imperial Brazil from 1500 to 1889. Offered in odd-numbered years.

**\*163B. History of Brazil (4) III. Poppino**

Lecture—3 hours; written reports. The history of the Brazilian republic from 1889 to the present. Offered in even-numbered years.

**164. History of Chile (4) II. Bauer**

Lecture—3 hours; term paper. Prerequisite: course 161A, 161B, 165, or 168 recommended. 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 in odd-numbered years.

**165. Latin American Social Revolutions (4) I. Poppino**

Lecture—3 hours; written reports. Major social upheavals since 1900 in selected Latin American nations; similarities and differences in cause, course, and consequence. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: History 4C, 17B, or Political Science 2.

**166A. History of Mexico to 1848 (4) III. Bauer**

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 even-numbered years.

**166B. History of Mexico Since 1848 (4) III. The Staff**

Lecture-discussion—3 hours; written and/or oral reports. History of Mexico from 1848 to the present. Offered in odd-numbered years.

**168. History of Inter-American Relations (4) II. Poppino**

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.

**169A. Mexican-American History (4) I. Ruiz**

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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 17A or 17B.

**169B. Mexican-American History (4) II. The Staff**

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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 17B.

**170A. Colonial America (4) I. Jacobson**

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.

**170B. The American Revolution (4) II. Jacobson**

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.

**\*170C. The Early National Period, 1789-1815 (4) III. Jacobson**

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.

**\*171A. The Jacksonian Era (4) I. Calhoun**

Lecture—3 hours. Political and social history of the American republic from the end of the War of 1812 to the Compromise of 1850.

**171B. U.S. Civil War: Politics and Society (4) II. Calhoun**

Lecture-discussion—3 hours; term paper. Social crisis, 1848-1877: slavery and the West, new political parties, secession, mobilization and emancipation, economic nationalism and Reconstruction (for military aspects, see course 173).

**173A. North America: Early Imperial Wars (4) II. Calhoun**

Lecture—3 hours; paper with scheduled consultation. European conquests, Native American resistance, early colonial protest actions and rebellions. Tactical styles of various peoples, conditions of effectiveness and failure, and the relation of strategy to social development and conflict. Offered in even-numbered years.

**173B. North America: Wars of National Expansion and Conservative Resistance (4) I. Calhoun**

Lecture—3 hours; paper with scheduled consulta-

tion. Later wars of colonial independence, including War of 1812. Maroon and Native American resistance. Rural and urban guerrillas. Campaigns to assert or resist national unity, including U.S. wars with Mexico and Confederacy. Military reconstruction and reform. Offered in odd-numbered years.

**173C. North America: Later Imperial Wars (4) III.**

Calhoun

Lecture—3 hours; paper with scheduled consultation. Military conflict and planning on the North American continent and adjacent islands, from the Spanish-American War to the present. Overt conflict aspects of internal protest, and military aspects of internal security operations.

**174A. The Emergence of Modern America, 1876-1914 (4) I.** Marchand

Lecture—3 hours; term paper. Rise of modern business and labor organizations, changing political institutions, the culmination and decline of Victorian culture, and the reaction of muckrakers, Populists, socialists, feminists and social reformers to industrialization and urbanization.

**174B. America in War, Prosperity and Depression, 1914-1945 (4) II.** Brody

Lecture—3 hours; term paper. America's emergence as a world power, the business culture of 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.

**174C. The United States Since World War II, 1945 to the Present (4) III.** Marchand

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.

**\*174D. Selected Themes in Twentieth-Century American History (4) III.** The Staff

Lecture—3 hours; term paper. Prerequisite: course 17B or the equivalent or consent of instructor. Interpretive overview of a single topic in twentieth-century America with emphasis on the phases and processes of historical change.

**175A. Intellectual History of the United States (4) I.** W. Smith

Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: course 17A or the equivalent; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. American thought from the Puritans through the era of the American Enlightenment. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4B or Philosophy 23.

**\*175B. Intellectual History of the United States (4) II.** W. Smith

Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: courses 17A and 17B or the equivalent; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. Nineteenth-century American thought from the 1820s to about 1900, emphasizing Transcendentalism, Jacksonian democratic thought, the impact of Darwinism, and pragmatism.

**\*175C. Intellectual History of the United States (4) III.** W. Smith

Lecture—3 hours; oral or written reports on reading; panel discussion preparation. Prerequisite: courses 17A and 17B or the equivalent; or a course in modern political theory, philosophy, American literature, or sociological theory. Twentieth-century American thought from about 1900 to the 1960s, emphasizing pragmatic liberalism, naturalism in law and literature, protestant liberalism and neo-orthodoxy, Freudian currents in social thought and social criticism of the 1960s.

**176A. Social and Cultural History of the United States (4) II.** Marchand

Lecture-discussion—3 hours; term paper. Study of

social and cultural forces in American society from colonial times through the Civil War with emphasis on social structure, immigration and nativism, racial and occupational groups, social reform movements and changes in social values.

**176B. Social and Cultural History of the United States (4) III.** Rosen

Lecture-discussion—3 hours; term paper and written or oral report. Study of social and cultural forces in American society since the Civil War with emphasis on social structure, immigration, urbanization, labor organizations, racial and national groups, social reform movements and changes in social values.

**177A. History of Black People and American Race Relations (4) I.** Walker

Lecture—3 hours; term papers. Prerequisite: course 17A or 17B. Afro-American history. History of black people in the United States from African background to Reconstruction. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 17A or 17B.

**177B. History of Black People and American Race Relations (4) II.** Walker

Lecture—3 hours; term papers. Prerequisite: course 17A or 17B. Afro-American history. History of black people in the United States from Reconstruction to the present. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 17A or 17B.

**\*178. American Colleges and Universities (4) III.**

W. Smith

Lecture—3 hours; term paper. A survey of American higher learning from colonial Harvard to the present, emphasizing institutional intellectual life and the role of colleges and universities in their larger society. Tutored term paper; readings of general interest. Offered in even-numbered years.

**\*179. The Working Class in American Society (4) I.** Brody

Lecture—3 hours; written reports. Prerequisite: course 17B recommended. American labor from the mid-nineteenth century to the present. Social, economic and political forces. Trade unionism and radical movements. Offered in even-numbered years.

**\*180A. Growth of American Politics to 1815 (4) I.** Goodman

Lecture—3 hours; extensive reading and supervised writing. The growth of American politics from the early settlements to 1815 focusing on the distribution of power, its change over time and the ways power has been used. Examines political party development and the social and ideological dimensions of political behavior.

**\*180B. Growth of American Politics, 1815-1890 (4) II, III.** Goodman

Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180A.

**180C. Growth of American Politics, 1890 to the Present (4) III.** Goodman

Lecture—3 hours; extensive reading and supervised writing. Continuation of course 180B.

**181. Religion in American History to 1900 (4) III.**

Jacobson

Lecture—2 hours; discussion—1 hour; oral and written reports. Religious ideas and institutions from the Puritans to about 1900. Survey of the large-scale social changes associated with revivalism and the great awakenings and the movement from Protestant orthodoxy to pluralism in industrial America.

**\*183A. The Frontier Experience: Trans-Mississippi West (4) III.** The Staff

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.

**\*183B. The Frontier Experience: Trans-Mississippi West (4) II.** M. Smith

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.

**\*185A. History of Science in America (4) II.** Sherwood

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.

**\*185B. History of Technology in America (4) III.**

Sherwood

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.

**187A. American Business History to the 1880s (4) I.** Rothstein

Lecture—3 hours; term paper. Changes in the role of entrepreneurs, organizations, and management practices from the colonial period to the 1880s, with emphasis on the transition from mercantile capitalism to industrial capitalism, marketing, financial intermediaries, and concentration. Offered in even-numbered years.

**187B. American Business History, 1880s to the Present (4) II.** Rothstein

Lecture—3 hours; term paper. Changes in the role of entrepreneurs, organizations, and management practices from the 1880s to the present, with emphasis on the transition from mercantile capitalism to industrial capitalism, marketing, financial intermediaries, and concentration. Offered in odd-numbered years.

**\*188A. History of Agriculture in the U.S. to 1900 (4) II.** Rothstein

Lecture—3 hours; term paper. Agricultural settlement and development in the U.S., with emphasis on government policies, economic and social institutions. Offered in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 17A, 17B, or Agrarian Studies 2.

**\*188B. History of Agriculture in the U.S. since 1900 (4) III.** Rothstein

Lecture—3 hours; term paper. Agricultural settlement and development in the U.S. with emphasis on government policies, economic and social institutions. Offered in even-numbered years. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: History 17B, Agrarian Studies 2, Agricultural Economics 120, or Political Science 1.

**\*189A. History of California (4) I.** M. Smith

Lecture—3 hours; written and/or oral reports. Spanish exploration and settlement; the mission as a frontier institution; revolt of the Californios; penetration by Mountain Men; pioneer trails and settlement; Bear Flag Revolt and Mexican War.

**\*189B. History of California (4) I.** M. Smith

Lecture—3 hours; written and/or oral reports. State constitution; land grant and Indian policies; Gold Rush; vigilantes; railroad construction; the wheat era; changing economy; social and literary developments; Progressive reform.

**189C. History of California (4) II.** M. Smith

Lecture—3 hours; written and/or oral reports. Impact of World War I; conservative reaction of the 1920s; rise of organized labor; the automobile and moving picture industry; New Deal developments; changes with World War II; role of minorities; contemporary politics.

**190A. Late Imperial China: Background to Revolution (4) II.** Liu

Lecture—2 hours; discussion—1 hour; term paper. Patterns and problems of Chinese life traced through the Ming and Ch'ing dynasties. Readings include literary materials in English translation (particularly novels) which reflect the social and intellectual scene, the elite ethos as well as popular culture. Offered in even-numbered years.

**190B. Late Imperial China: Background to Revolution** (4) II. Liu

Lecture—2 hours; discussion—1 hour; term paper. Internal and external pressures in China from the early nineteenth through the early twentieth century. Emphasis on the impact of the West and the beginnings of revolutionary change. Offered in odd-numbered years.

**190C. The Chinese Revolution** (4) I. Price

Lecture—3 hours; term paper. 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.

**191A. Classical China** (4) II. Price

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.

**\*191B. High Imperial China** (4) III. Price

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.

**192. Internship in History** (2-5) I, II, III. The Staff

(Chairperson in charge)

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.)

**\*193. History of the People's Republic of China, 1949 to the Present** (4) I. Liu

Lecture—2 hours; discussion—1 hour; term paper. Comprehensive analysis of recent Chinese history, including land reform, the Cultural Revolution, the post-Mao era, and China's foreign relations from 1949 to the present. Offered in even-numbered years.

**194A. Aristocratic and Feudal Japan** (4) I. Kinmonth

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 odd-numbered years.

**194B. Early Modern Japan** (4) III. Kinmonth

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.

**\*194C. Modern Japan** (4) II. Kinmonth

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.

**194D. Business and Labor in Modern Japan** (4) I. Kinmonth

Lecture—3 hours; term paper or papers. Survey of labor and management relations in Japan from the mid-eighteenth century to the present. Offered in even-numbered years.

**\*194E. Education and Technology in Modern Japan** (4) I. Kinmonth

Lecture—3 hours; term papers. Survey of education and technology in Japan from the mid-eighteenth century to the present. Offered in odd-numbered years.

**\*195. Modern China and the West** (4) I. Liu

Lecture—2 hours; discussion—1 hour; term paper. History of European and American relations with China, political, cultural and economic, in the context of East Asian international relations and emphasizing

the twentieth century. Offered in odd-numbered years.

**\*196A. Medieval India** (4) I. Metcalf

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.

**\*196B. Modern India** (4) II. Metcalf

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.

**197T. Tutoring in History** (2) I, II, III. The Staff

(Chairperson in charge)

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 once for credit. No final examination. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor; upper division standing. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates**

(1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses****201A-N. Sources and General Literature of History** (4) I, II, III. The Staff

Seminar—3 hours. Designed primarily for students preparing for higher degrees in history. (A) Ancient; (B) Medieval; (C) Renaissance and Reformation; (E) Europe since 1815; (F) China to 1880; (G) China since 1880; (H) Britain; (I) Latin America since 1810; (J) American History to 1787; (K) United States, 1787-1896; (L) United States since 1896; (N) Modern Japan. May be repeated for credit when different subject area is studied.

**202A-I. Major Issues in Historical Interpretation**

(4) I, II, III. The Staff

Seminar—3 hours; term paper. Prerequisite: graduate standing. Fundamental issues and debates in the study of history. (A) Ancient; (B) Medieval Europe; (C) Modern Europe; (D) India; (E) Africa; (F) China; (G) Japan; (H) United States; (I) Latin America. Readings, papers, and class reports. May be repeated for credit when a different subject area is studied.

**203. Seminar Research** (4) I, II, III. The Staff (Chairperson in charge)

Seminar—3 hours. Prerequisite: consent of instructor. Designed primarily for students preparing for higher degrees in History. Individual research and analysis resulting in substantial research paper. May be repeated for credit.

**204A. Historiography** (4) II. The Staff (Chairperson in charge)

Seminar—3 hours; research paper. Prerequisite: consent of instructor for non-History graduate students. Introduction to major works of historical scholarship from the Greeks to the present.

**204B. New Methods of Historical Research** (4) III. The Staff (Chairperson in charge)

Seminar—3 hours; research paper. Prerequisite: consent of instructor for non-History graduate students. Introduction to basic historical data, to the methods currently employed in historical research, and to the problems of presenting findings in a literary form.

**\*204C. Thematic Seminar** (4) III. The Staff (Chairperson in charge)

Seminar—3 hours; research paper. Prerequisite: consent of instructor for non-History graduate students. Interdisciplinary seminar emphasizing socioeconomic, political, and intellectual themes. May be repeated

ed for credit.

**\*211. Ancient History** (4) I, II.

Seminar—3 hours. Prerequisite: courses 111A, 111B, 111C. Seminar dealing with the various aspects of Near Eastern and Greco-Roman civilization.

**212. Medieval History** (4) I, II. Bowsky

Seminar—3 hours. Prerequisite: courses 121A, 121B, 121C recommended. Topics in the history of medieval and early Renaissance Europe.

**\*237. Russian History** (4) I.

Seminar—3 hours. Prerequisite: a reading knowledge of Russian. Topics relating to the history of Muscovite and Imperial Russia before 1856.

**\*242. History of the Enlightenment** (4) III. Schwab

Seminar—3 hours. Prerequisite: a reading knowledge of French. Intellectual and social history of Europe during the Enlightenment. May be repeated for credit.

**245. Modern European History** (4) I. Margadant

Seminar—3 hours. Prerequisite: course 201E. Primary sources and research methodologies in the history of modern France and Germany. May be repeated once for credit.

**\*246. Europe in the Twentieth Century** (4) II. Willis

Seminar—3 hours. Political history of Europe since 1919, with particular emphasis on the post-1939 period.

**\*261. Latin American History** (4) I, II, III. Bauer, Poppino

Seminar—3 hours. Prerequisite: two courses in Latin American history; reading knowledge of Spanish or Portuguese.

**\*270. Early American History** (4) III. Jacobson

Seminar—3 hours.

**\*271. History of the United States, 1760-1815** (4) II. Goodman

Seminar—3 hours.

**\*272. History of the United States, 1815-1848** (4) I. Calhoun

Seminar—3 hours.

**\*273A-273B. Research Seminar in the Comparative History of Women and the Family** (4-4) I-II. Rosen

Seminar—3 hours; paper. Research in literature, methods, and historical approaches to the area of women and the family culminating in each student completing a research paper in this field. (Deferred grading only, pending completion of sequence.)

**274. Recent History of the United States** (4) I.

Seminar—3 hours. Topics in twentieth-century American history.

**275. American Social and Intellectual History** (4) II. W. Smith

Seminar—3 hours. Prerequisite: courses 175A, 175B and 175C or the equivalent; or consent of instructor. Studies in the recent historiography of, or research and writing in, American social and intellectual history. May be repeated for credit.

**276. Social History of Science and Technology in America** (4) III. Sherwood

Seminar—3 hours. Prerequisite: graduate standing. Studies in the historiography of, and research in, the history of science and technology in America from colonial times to the present.

**\*278A. Seminar: Topics in Afro-American History** (4) I.

Seminar—3 hours; term papers. Prerequisite: graduate students in history or consent of instructor. Examination of a series of topics (demographic, economic, social, cultural, and political) in Afro-American history from the African background to the present. Particular attention is given historiography, methodology, and problems in research on Afro-American life and history. Offered in even-numbered years. (Deferred grading only, pending completion of two-course sequence.)

**\*278B. Seminar: Topics in Afro-American History** (4) II.

Seminar—3 hours; term papers. Prerequisite: graduate students in history or consent of instructor. Exam-

ination of series of topics (demographic, economic, social, cultural, and political) in Afro-American history from the African background to the present. Particular attention is given historiography, methodology, and problems in research on Afro-American life and history. Offered in odd-numbered years. (Deferred grading only, pending completion of two-course sequence.)

**\*279. History of the United States: the Twentieth Century (4) III.** Brody

Seminar—3 hours. Emphasis on social and economic developments.

**\*283. History of the United States: The Frontier (4) III.** Jackson

Seminar—3 hours.

**\*288. History of the United States (4) III.** Rothstein

Seminar—3 hours. Prerequisite: graduate standing. Emphasis on agricultural history and closely related topics such as exports, transportation and politics.

**291A-291B. Chinese History (4-4) II, III.** Liu, Price

Seminar—3 hours; article-length 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.

**291C. Chinese History (4) III.** Price

Seminar—3 hours. Prerequisite: reading knowledge of Chinese. Readings in Chinese historical materials. Training in the techniques of using Chinese reference works will be provided.

**298. Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

**299. Research (1-12) I, II, III.** The Staff (Chairperson in charge)

(S/U grading only.)

**299D. Individual Study (1-12) I, II, III.** The Staff

(Chairperson in charge)

(S/U grading only.)

**Professional Courses**

**300. Teaching History in the Community College (3) I.** Sherwood

Discussion-laboratory—3 hours. Prerequisite: graduate standing. Designed for MAT students. Methods for the presentation of history at the community college and secondary school level. (S/U grading only.)

**390. Teaching History in College (2) I, II, III.** The Staff

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.)

## Home Economics

(College of Agricultural and Environmental Sciences)

### Program of Study

The Home Economics major is no longer available at UC Davis. If you have begun course work for this major as an enrolled student before spring quarter 1987, you may complete a B.S. degree by following the major requirements as listed in a prior edition of this catalog.

### Courses in Home Economics

#### Lower Division Courses

**\*90. Challenges and Opportunities in Home Economics (1) III.**

Seminar—1 hour. Specialists in selected areas of home economics address current issues facing today's professional including challenges, opportunities, and prospects for appropriately trained university graduates. May be repeated once for credit with consent of instructor. (P/NP grading only.) Offered in odd-numbered years.

**\*92. Internship in Home Economics (1-12) I, II, III.**

The Staff

Laboratory—3-36 hours. Prerequisite: consent of

instructor. Work-learn experience off and on campus in a home economics related area. Internship supervised by a member of the faculty. (P/NP grading only.)

#### Upper Division Courses

**\*192. Internship in Home Economics (1-12) I, II, III.**

The Staff

Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-learn experience off and on campus in a home economics related area. Internship supervised by a member of the faculty. (P/NP grading only.)

**\*198. Directed Group Study (1-5) I, II, III.**

The Staff

Prerequisite: consent of instructor. (P/NP grading only.)

**\*199. Special Study for Advanced Undergraduates (1-5) I, II, III.**

The Staff

Prerequisite: consent of instructor. (P/NP grading only.)

dents, or faculty on selected topics in horticulture. (S/U grading only.)

## Human Development

(College of Agricultural and Environmental Sciences)

### Faculty

See under Department of Applied Behavioral Sciences.

### The Major Program

Human Development is an appropriate undergraduate major if you want to explore the developmental process in humans throughout the life cycle. Concentrating on the periods between birth and young adulthood, cognitive and personality/ social development are studied from various perspectives. The emphasis is on the interrelationship of the person, the family, and the community. It is an appropriate major for those planning to pursue advanced degrees in the behavioral sciences and offers course work useful for persons who will later pursue careers in education, child guidance, social welfare, health science related fields, or research in human development.

Human Development majors observe infants, children, and adults in a variety of situations. You may also participate in study projects with people from different socioeconomic and cultural backgrounds who function in a variety of institutional settings (schools, hospitals, mental health clinics, and group foster homes).

Students who anticipate exploring the biological aspects of Human Development should include in their preparatory course work the prerequisites for upper division biological sciences courses.

### B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITS

**Written/Oral Expression .....** **10-12**

See College requirement ..... 7-8

Additional English (choose from English 102, 103, 104) ..... 3-4

**Preparatory Subject Matter .....** **38-44**

Anthropology 1, 2, and 15 ..... 13

Biological sciences (Biological Sciences 1A\* or 10)† ..... 4-5

Genetics (Genetics 10 or 100)† ..... 4

Human development (Human Development 30) ..... 4

Nutrition (Nutrition 10 or 101) ..... 3-5

Physiology (Physiology 10 or 110\* or Biological Sciences 1B\*\*)† ..... 3-5

Psychology (Psychology 1 or 15) ..... 3-4

Statistics (Education 114, Psychology 41, Sociology 46A and 46B, or Statistics 13) ..... 4

\* Zoology 10 or Psychology 108 only if Physiology 10 is not offered. (See your faculty adviser if unsure.)

\*\* Chemistry 1A is recommended pre-requisite for Biological Sciences 1A.

Biological Sciences 1A is prerequisite for Biological Sciences 1B.

† Taking the entire Biological Sciences 1A, 1B, 1C sequence will satisfy the Biological science, Genetics, and Physiology requirements.

**Breadth/General Education .....** **14-32**

Satisfaction of General Education requirement ..... 6-24

American history/American government (Political Science) ..... 8

## Home Economics Education

### See Agricultural and Home Economics Education

## Horticulture (A Graduate Group)

Ellen G. Sutter, Ph.D., Chairperson of the Group

Group Office, 1045 Wickson Hall

**Faculty.** The faculty includes departmental members of Environmental Horticulture, Pomology, and Viticulture and Enology.

**Graduate Study.** The Graduate Group in Horticulture offers programs of study leading to the M.S. degree under the two master's degree options: thesis or comprehensive examination.

**Preparation.** A level of competence equivalent to that of a sound undergraduate program in Plant Science is required. This includes course work in general botany, chemistry, physics, statistics, genetics and introductory plant physiology. 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 and may be obtained from the Group Office.

**Graduate Advisers.** Information relative to advisers available in each of the three departments above may be obtained from the Department of Pomology or the Group Office.

**Related Courses.** Pertinent graduate courses in horticulture may be found by reviewing the Catalog under the departmental categories of Environmental Horticulture, Pomology, Viticulture and Enology, Plant Science, and Plant Physiology.

## Courses in Horticulture

#### Graduate Courses

**251. Modeling Horticultural Systems (3) II.** Liebh

Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 101, calculus, or consent of instructor. Introduces students to systems modeling. Primary emphasis on physiological and ecological models with examples drawn from areas of interest to class participants. Applications to horticultural systems will be explored. Students will receive hands-on experience.

**290. Seminar (1) I, II, III.** The Staff

Seminar—1 hour. Prerequisite: graduate standing at UCD. Seminars presented by invited speakers, stu-

<b>Depth Subject Matter</b>	<b>52</b>
Human Development 100A, 100B, 100C, 110	16
Social-cultural processes (Human Development 102 or 103)	4
Assessment (Human Development 120 or 121)	4
Cognitive processes (Human Development 101 or 132)	4
Exceptional children (Human Development 130 or 131)	4
Practicum (Human Development 140-140L, or 141 or 142)	4
Four additional upper division courses chosen from the Human Development courses or from a list of restricted electives (in consultation with faculty adviser)	16
<b>Unrestricted Electives</b>	<b>40-67</b>
<b>Total Units for the Degree</b>	<b>180</b>

**Major Adviser.** L.V. Harper.

**Related Major Program.** See the major in Applied Behavioral Sciences.

## Minor Program Requirements:

	UNITS
<b>Aging and Adult Development</b>	<b>21-27</b>
Human Development 100C, 160, 191	8
Community Health 180	3
Human Development 110, Applied Behavioral Sciences 173	8
Practicum, 2 units minimum	2-8

**Minor Adviser.** L.V. Harper.

**UNITS**

<b>Human Development</b>	<b>20</b>
Human Development 100A	4
Human Development 100B or 100C	4
Human Development 110 or 103 or 151	4
Two courses from Human Development 101, 102, 130, 131, or 132	8

**Minor Adviser.** L.V. Harper.

**Graduate Study.** Refer to the Graduate Division section in this catalog.

## Courses in Human Development

Questions pertaining to the following courses should be directed to the instructor or to the Applied Behavioral Sciences Advising Office, 101 AOB 4 (916-752-2244).

### Lower Division Courses

#### 12. Human Sexuality (2) I, II, III. Golanty

Lecture—2 hours. Vocabulary; structure and function of genital system; sexual response; menstruation; fertility; birth control; pregnancy and childbirth; sex in religion and law; sex education; homosexuality; masturbation; establishing and maintaining intimacy; intimate communication; attitudes and values; sexual dysfunctions; lovemaking. (P/NP grading only.)

#### 15. Family and the Life Cycle (4) II. Welker

Lecture—4 hours. Prerequisite: Psychology 1, or 15 and 16. Socialization in families throughout the life cycle. Impact of alcoholism and abuse. Sources of strength and help. Not open for credit to students who have completed courses 100A, 100B, 110 and/or Psychology 112, 114, and 115. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Psychology 15-16.

#### 19. Life Cycles, Kinship, and Growth in Human Populations (4) I. Carey

Lecture—3 hours; discussion—1 hour. Human populations at different levels of organization; including life course, family life cycle, race, ethnicity, genealogy, and population traits and changes. General Education credit: Nature and Environment/Introductory.

#### 30. Observation Techniques in Human Development (4) I, III. Stockman

Lecture—3 hours; laboratory—3 hours. Prerequisite: Psychology 1 and consent of instructor. Observational techniques used in the study of human behavior

and development, with focus on ages six months to five years; analysis and use of observational data. Students may not preenroll for this course, but must sign up for laboratory time at the Early Childhood Laboratory prior to in-person enrollment.

#### \*30B. Observational Techniques and Case Study of A Young Child (1) I, II, III. Stockman

Seminar—1 hour. Prerequisite: course 30A. Observational techniques. Intensive case study of individual child aged six months to 5 years; analysis and use of observational data. (Deferred grading only, pending completion of 30A-30B sequence.) (Course 30B is being phased out.)

#### 98. Directed Group Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

### Upper Division Courses

#### 100A. Infancy and Early Childhood (4) I. Harper

Lecture—4 hours. Prerequisite: Psychology 1 or 15, Biological Sciences 1A or 10. Analysis of the biological, social, and cultural influences in the psychological growth and development of children, prenatal through age six.

#### 100B. Middle Childhood and Adolescence (4) II. The Staff

Lecture—4 hours; three brief observations of school-age children. Prerequisite: course 100A or the equivalent; introductory biology. Analysis of the interplay of biological and social-cultural factors in the emotional, cognitive and social development from middle childhood through adolescence.

#### 100C. Adulthood (4) III. The Staff

Lecture—3 hours; to be arranged—1 hour. Prerequisite: courses Psychology 1 or 15. Biological, cognitive and social psychological aspects of adult development.

#### 101. Cognitive Development (4) II. The Staff

Lecture—4 hours. Prerequisite: courses 100A-100B or Psychology 112. Theories of cognitive development including developmental views of perception, learning, memory, concept formation, and language.

#### 102. Social and Personality Development (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: introductory psychology; course 100B or the equivalent. Theories of development of a child's personality through interactions with children and adults; development of interpersonal and culturally valued skills.

#### 103. Cross-Cultural Study of Children (4) III. Werner

Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Cross-cultural studies of children in developing countries and among minority groups in the U.S.

#### 110. Contemporary American Family (4) III. Chisholm

Lecture—4 hours. Prerequisite: introductory psychology. Factors currently influencing American families including changing economic conditions, changing sex roles, divorce, and parenthood; theories and research on family interaction.

#### 120. Research Methods in Human Development (4) I. The Staff

Lecture—3 hours; laboratory-discussion—1 hour. Prerequisite: courses 100A and 100B; elementary statistics. Research methods in selected areas of human development (i.e., infancy, learning, cognition, personality).

#### 121. Psychological Assessment (4) I. The Staff; III. Barton

Lecture—4 hours. Prerequisite: courses 100A-100B; elementary statistics. Current issues and methodology related to the process of psychological assessment with children.

#### 130. Emotionally Disturbed Children (4) I. Bryant

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A-100B or consent of instructor. Discussion of psychosis, neurosis, behavior disorders, and

learning difficulties in children.

#### 131. Developmental Disabilities (4) I. Barton

Lecture—4 hours. Prerequisite: course 100A or consent of instructor. Mental retardation and special learning disabilities. etiology, diagnosis, education and socialization. Introduction to community resources.

#### 132. Individual Differences in Giftedness (4) III. Kraft

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100A-100B or consent of instructor. Conceptualization, identification and education of the intelligent, the creative, and the talented, gifted individual.

#### 140. Communication and Interaction with Young Children (2) I, II, III. Stockman

Lecture—2 hours. Prerequisite: courses 30A, 100A, and 140L (may be taken concurrently) recommended. Theory and practice in the area of effective interaction with young children. Humanistic, child-centered approaches; awareness of goals, beliefs, and values as these affect interactions. Students may not preenroll for this course, but must sign up for laboratory time at the Early Childhood Laboratory prior to in-person enrollment.

#### 140L. Laboratory in Early Childhood (3-6) I, II, III. Stockman

Discussion—1-3 hours; laboratory—6-12 hours. Prerequisite course 140 (may be taken concurrently). Application of theories of learning and development to interaction with children six months to five years at Early Childhood Laboratory. Applied skills in communication, discipline and curriculum. May be repeated for credit for a total of 12 units.

#### 141. Field Studies with Children and Adolescents (4-6) II, III. The Staff

Discussion—2 hours, field study—6-12 hours. Prerequisite: course 100B or the equivalent and 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 following consultation with and consent of instructor.

#### 142. Field Studies with Exceptional Children (4-6) I. Bryant

Discussion—1 1/2 hours; field study—6-12 hours. Prerequisite: consent of instructor and one course from courses 130, 131, or 132 (may be taken concurrently). Field study with children who are identified as developmentally disabled, emotionally distressed, or intellectually gifted. May be repeated for credit for a total of 12 units following consultation with and consent of instructor.

#### 150. Supervision and Administration of Early Childhood Education Programs (4) I. Welker

Lecture—40 hours total. Prerequisite: course 140 or prior experience in an early childhood education program. History of early childhood programs in California; federal, state and local regulations. Implications of different regulations for; funds and budgets; policy making mechanisms; professional and legal responsibilities; staff development; and professional attitudes and issues.

#### 151. Shared Child Care (4) II. Werner

Lecture—4 hours. Prerequisite: courses 100A or 110, Psychology 112, or Anthropology 131. Examines roles of caregivers other than parents in contemporary society, and the impact of grandparents, siblings, family day care providers, foster parents, church- and employer-sponsored child care on children's development. Reviews child care legislation and social policy issues.

#### 160. Social Aspects of Aging (4) II. The Staff

Lecture—4 hours. Prerequisite: course 100C or Psychology 115. Major characteristics, needs, and interests of older people in contemporary America. Emphasis on social problems and community approaches to their solutions.

#### \*190C. Introductory Research Conference (1) I, II, III. The Staff

Discussion—1 hour. Prerequisite: involvement in

ongoing research. 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.)

**191. Proseminar: Issues in Aging** (2) I. The Staff Seminar—2 hours. Prerequisite: upper division standing. Discussion of selected critical issues in aging.

**192. Internship** (1-12) I, II, III. The Staff (Chairperson in charge) Field placement—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) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

#### Graduate Courses

**200A. Early Development** (4) I. Harper

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing; basic biology/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.

**200B. Middle Childhood and Adolescence** (4) II.

Bryant 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.

**200C. Development in Adulthood** (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing; basic biology or physiology; two upper division or graduate-level courses in psychology or the equivalent. Theory and research on the biological, cognitive, social and cultural aspects of behavioral development from young adulthood to death.

**\*201. Social-Emotional Development in Infancy**

(4) II. The Staff

Lecture-discussion—4 hours. Prerequisite: course 200A. Analysis of theory, methods, and research on social-emotional development in infancy. Emphasizes the development of primary and secondary emotions, and the development of attachment. Other possible topics include infant temperament, sex differences, compliance, and self-regulation.

**\*203. Development in Middle Childhood** (3) II.

Bryant

Seminar—3 hours. Prerequisite: graduate standing; some background in developmental psychology or human development; consent of instructor. Critical evaluation of current theory and research regarding normal and "abnormal" development in middle childhood. Emphasizes social-emotional development in varying contexts (family, school, neighborhood) and considers the interplay of cognitive, biological, social, and emotional processes during middle childhood. Offered in even-numbered years.

**\*210. Theories of Behavioral Development** (3) III.

The Staff

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 even-numbered years.

**\*211. Physiological Correlates of Behavioral Development** (3) I, Harper

Seminar—3 hours. Prerequisite: consent of instructor. An overview of mechanisms of organismic develop-

ment 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.

**\*213. Cross-Cultural Study of Children** (3) III. Werner

Lecture—2 hours; discussion—1 hour; field project or paper. Prerequisite: graduate standing in Human Development, Education, Anthropology, Psychology or Sociology. Current theory and research concerned with comparative child development. Introduction into the major issues and methods of cross-cultural research (e.g., biological, cognitive and social development of children in different cultures and subcultures in U.S.A.).

**\*217. Development of Cortical and Perceptual Laterality** (3) II. Kraft

Seminar—3 hours. Prerequisite: graduate standing in child or human development or consent of instructor. Current theory and research regarding the development of human cortical and perceptual laterality—emphasizing the relationship of this development to thinking and behavior.

**220. Research Methods in Human Growth and Development** (3) II. The Staff

Lecture—3 hours. Prerequisite: Statistics 13 or the equivalent and at least two upper division courses in human biology or developmental psychology. Theory and research methods in biological growth, and cognitive and social/emotional development from prenatal period to death.

**221. Psychological Assessment of Children** (4) III.

Barton

Lecture—2 hours; discussion—2 hours. Prerequisite: course 121 or consent of instructor. Study of children's behavior through examination, analysis and evaluation of perceptual-motor, cognitive, affective and social development. Problems in assessment of exceptional children considered. Assignments focus on preparation of a comprehensive report on one child.

**\*225. Behavioral Development and Food Intake**

(4) III. Pollitt

Lecture—3 hours; discussion—1 hour. Prerequisite: graduate standing in Human Development (and related fields) and Nutrition. Multidisciplinary view covering key theoretical and research issues in basic human development processes related to food intake.

**\*231. Issues in Cognitive and Linguistic Development** (3) III. Kraft

Seminar—3 hours. Prerequisite: consent of instructor. Study and evaluation of key issues in the theoretical and empirical literature on cognitive and linguistic development.

**\*237. Parent-Child Interaction** (3) III. The Staff

Seminar—3 hours. Prerequisite: consent of instructor; upper division course on the family recommended. Current theory and research. Emphasis on parental behavior in other animals and other cultures, childrearing practices, the child's perception of parents, the differential influence of each parent on the child's psychological well-being, sex-role development, and moral development.

**\*241. Consultation Approaches to Child Development** (3) II. Bryant

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: graduate standing; supervised field experience with children (e.g., course 140, 141, 142, may be taken concurrently); and consent of instructor. Analysis and application of theories and approaches of consultation and child development to facilitate delivery of child-related services (e.g., educational and mental health). Develop working knowledge of consultation skills for working with adults directly interacting with children and adolescents.

**\*290. Seminar** (3) I, II, III. The Staff

Seminar—3 hours. Discussion and evaluation of theories, research, and issues in human development. Different topics each quarter.

**\*290C. Research Conference** (1) I, II, III. The Staff 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.)

**291. Research Issues in Human Development** (3)

I. The Staff; II. Werner

Lecture—3 hours. Prerequisite: graduate standing in the behavioral sciences. In-depth presentations of research issues in particular areas of behavioral development.

**298. Group Study** (1-5) I. Chisholm; II, III. The Staff (Chairperson in charge)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

## Humanities

(College of Letters and Science)

James J. Murphy, Ph.D., Program Director  
Program Office, 922 Sproul Hall (916-752-1219)

#### Committee in Charge

Ingeborg Henderson, Ph.D., (German)  
Robert H. Hopkins, Ph.D. (English)  
Earl H. Kinmonth, Ph.D. (History)  
James J. Murphy, Ph.D. (Rhetoric and  
Communication, English), Chairperson  
Lynn E. Roller, Ph.D. (Classics)

#### The Program of Study

Courses in the Humanities Program are designed to provide instruction in interdisciplinary areas which do not fit readily into existing departments or programs.

#### Courses in Humanities

##### Lower Division Course

**40. Introduction to Computing in the Humanities** (4) II. Roddy

Lecture—3 hours; laboratory—3 hours. Survey of current approaches to use of computers in such fields as language, literature, history, art, music, and drama. Laboratory in text creation and analysis.

##### Upper Division Courses

**140. Advanced Computing in the Humanities** (4)

III. Roddy

Lecture—3 hours; laboratory—3 hours; research project. Prerequisite: course 40 or consent of instructor. The computer as support for the humanities. Topics include advanced textual analysis, editing, vocabulary control, and data base management (design, application and evaluation, and search strategies).

**180. Topics in the Humanities** (4) I, II, III. The Staff

Lecture-discussion—4 hours; term paper. Analysis of interdisciplinary issues in the humanities. Topics will vary. May be repeated once for credit.

**198. Directed Group Study** (1-4) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates**

(1-4) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

#### Graduate Courses

**250. Topics in Humanities** (4) I, II, III. The Staff (Program Director in charge)

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Topics in the humanities, selected by the instructor. May be repeated once for credit.

**299. Individual Research** (1-4) I, II, III. The Staff (Program Director in charge) Individual research in the humanities resulting in a formal written research report. (S/U grading only.)

## Immunology (A Graduate Group)

M. Eric Gershwin, M.D., Chairperson of the Group  
Group Office, 3146 Medical Sciences-1A  
(916-752-3392)

**Faculty.** The faculty includes members from several colleges and the Schools of Medicine and Veterinary Medicine.

**Graduate Study.** The Graduate Group in Immunology is a multi-disciplinary group offering programs of study leading to the M.S. and Ph.D. degrees in various aspects of immunology. The Master's degree is offered under the two master's degree options: thesis or comprehensive examination.

**Preparation.** Applicants for candidacy to these programs should have completed undergraduate preparation in general biology, zoology or botany, general bacteriology or microbiology, general genetics, mathematics, general physics, chemistry, and biochemistry.

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, protozoology, 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.** Contact the Group Office.

### Courses in Immunology

#### Graduate Course

**292. Immunotoxicology Seminar** (2) II. Golub Seminar—2 hours. Prerequisite: graduate standing. 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. Offered in odd-numbered years. (S/U grading only.)

**296. Investigative Immunology** (1) I, II, III. DeNardo Seminar—3 hours. Prerequisite: graduate standing. Presentation, discussion, and analysis of topics in immunological research. (S/U grading only.)

Additional courses are available and listed under the individual sponsoring departments. Contact the group office for information.

## Individual Major

(Colleges of Agricultural and Environmental Sciences and 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 spe-

cific interest which 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.

Proposals for individual majors should be submitted before the fourth quarter prior to graduation. Specific requirements for each college are shown below. Application forms are available in program offices.

### College of Agricultural and Environmental Sciences

Program Office, 122 Hoagland Hall (916-752-0610)

#### 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

An individualized program of 45 upper division units taken from two or more areas of study. At least 30 of the 45 units must be taken from courses provided by the College.

**Unrestricted Electives** .....(variable)

**Total Units for the Degree** .....180

#### Additional requirements

At least 54 of the 180 units needed for graduation must be upper division. The College also requires satisfaction of the General Education Requirement and not less than 7 units in English and/or Rhetoric and Communication courses that emphasize written or oral expression (see College requirement).

**Master Adviser.** C.L. Keen (*Nutrition*). The course of study must be developed in consultation with the Master Adviser, and two or more faculty members prior to final review by the Individual Major Committee for the College.

Incoming transfer students applying for an Individual Major will be admitted into the Exploratory Program.

### College of Letters and Science

Program Office, 150 Mrak Hall (Dean's Office), (916-752-0392)

#### Committee in Charge

Ed M. Bernauer, Ph.D. (*Physical Education*)  
Robert D. Glauz, Ph.D. (*Mathematics*)  
Robert M. Murphy, Ph.D., Chair (*Psychology*)  
Peter M. Schaeffer, Ph.D. (*German and Russian*)

#### 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:

- interrelated and complementary courses from two or more departments which provide a unified pattern and focus;
- at least 30 units from Letters and Science teaching departments or programs;
- no more than 10 units in courses numbered 194H, 198 and 199.

**Total Units for Degree** .....180

**Student Proposal.** A student submits to the Dean's Office a major proposal and an essay, discussing educational purposes, personal and/or professional objectives, along with faculty letters of recommendation. After initial review, the Faculty Committee on Individual Majors evaluates the proposal and pro-

vides final action.

**Major Advisers** (selected by student). *Principal Adviser:* a faculty member in a teaching department or program in the College of Letters and Science in major field of emphasis. *Secondary Adviser:* a faculty member from secondary area of interest.

**Honors Program.** Toward the end 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 during the first quarter of the senior year. Graduation with highest honors will be conditional upon both the maintenance of the required grade-point average and the completion of the senior thesis project. The Committee will consider alteration of the student's original major proposal to allow up to 3 units of independent study during each of the last two quarters of the senior year for work on senior honors thesis.

## Integrated Studies

(College of Letters and Science)  
Nora A. McGuinness, Ph.D., Program Director  
Program Office, 816 Sproul Hall (916-752-3377)

#### Committee in Charge

Daniel R. Brower, Jr., Ph.D. (*History*)  
Richard T. Curley, Ph.D. (*Anthropology*)  
Gordon J. Edlin, Ph.D. (*Genetics*)  
Bruce M. Hackett, Ph.D. (*Sociology*)  
Kurt Keith, Ph.D., (*Mathematics*)  
Arthur E. McGuinness, Ph.D. (*English*)  
Nora A. McGuinness, Ph.D. (*Integrated Studies*)  
David A. Robertson, Ph.D. (*English*)  
Daniel L. Wick, Ph.D. (*Integrated Studies*)

#### Faculty

John Boe, Ph.D., Lecturer (*English*)  
Thomas A. Cahill, Ph.D., Professor (*Physics*)  
Vincent A. Crockenberg, Ph.D., Lecturer (*Education*)  
Richard T. Curley, Ph.D., Associate Professor (*Anthropology*)  
Gordon J. Edlin, Ph.D., Professor (*Genetics*)  
Bruce M. Hackett, Ph.D., Associate Professor (*Sociology*)  
Alfred Heusner, D.S., Professor (*Physiological Sciences*)  
Kurt Keith, Ph.D., Professor (*Mathematics*)  
Nora A. McGuinness, Ph.D., Lecturer (*Integrated Studies*)  
Jay Mechling, Ph.D., Professor (*American Studies*)  
Deborah Pittman, M.A., Lecturer (*Music*)  
Ted W. Reid, Ph.D., Professor in Residence (*Ophthalmology*)  
Mark Sanders, Ph.D., Lecturer (*Genetics*)  
Eric Schroeder, Ph.D., Lecturer (*English*)  
Kenneth L. Verosub, Ph.D., Professor (*Geology*)  
Gary M. Walton, Ph.D., Professor (*Management, Economics*)  
Daniel L. Wick, Ph.D., Lecturer (*Integrated Studies*)

#### The Program of Study

Integrated Studies is a freshman Honors residential program which introduces students to a variety of disciplines in humanities, natural sciences, and social sciences. The program encourages cross-disciplinary interests in its faculty and students. It values close contact between student and professor both in the classroom and in the residence hall. Integrated Studies courses fulfill college breadth requirements and many of its courses fulfill the campus General Education requirements. Enrollments are limited. (In 1990-91, 120 students will be admitted to the program. Class sizes are approximately 25-30.)

Students enroll in at least three Integrated Studies courses during the year. **Students not admitted to the Program may not enroll for Integrated Studies courses.**

## Courses in Integrated Studies

### Lower Division Courses

#### 1A. Nature and the Environment: Physics (4) III.

Cahill

Lecture—2 hours; discussion—2 hours. Introductory course on the history, philosophy and methodology of physics from 600 B.C. to the present day. Changes in ideas about the physical universe explored. Problem solving not emphasized. General Education credit: Nature and Environment/Introductory.

#### 1B. Nature and the Environment: Origins of the Universe (4) I. Edlin

Lecture—3 hours; discussion—1 hour. Knowledge of the origins of the universe, of matter, of galaxies, stars, and planets, and of the earth and the variety of life forms that have evolved on this planet. General Education credit: Nature and Environment/Introductory.

#### 1C. Nature and the Environment: Molecules to Humans (4) II. Reid

Lecture—3 hours; discussion—1 hour. Prerequisite: high school chemistry. Intended for liberal arts students. Integrates the principles of chemistry, biochemistry, genetics and molecular biology. Students are expected to achieve a fair scientific literacy in all of the subjects.

#### 2A. Civilization and Culture: Mathematics and Civilization (4) I. Kreith

Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra and geometry. Topics from arithmetic, geometry, algebra and probability presented in historical context which is designed to convey an appreciation of the role that mathematics has played in shaping our world and civilization.

#### \*2B. Civilization and Culture: Theology (4) I.

Robertson

Discussion—4 hours. Major issues in theology, including the existence and nature of God, the nature and destiny of the human species, free will, and morality from both a western and eastern perspective. General Education credit: Civilization and Culture/Introductory.

#### \*2C. Civilization and Culture: Origins of Western Civilization (4) III. Roller

Lecture—3 hours; discussion—1 hour. Civilizations of the ancient Near East and Greece: the problem of divine-human relations, problems of law and justice, and development of science and of logical thought. Readings include selections from Near Eastern texts and from Greek literature.

#### \*2D. Civilization and Culture: Literature and Writing (4) I. McGuinness

Lecture—3 hours; small-group writing workshop. Prerequisite: completion of Subject A requirement. Exposure to basic methods of literary analysis in drama, fiction and poetry and concepts that guide literary scholars in making critical judgments. Formal writing training. General Education credit: Civilization and Culture/Introductory.

#### 2E. Civilization and Culture: Playing Shakespeare (4) III. Schroeder (Dramatic Art)

Lecture—3 hours; laboratory—2 hours. Prerequisite: completion of Subject A requirement. Shakespeare as a theatre professional: producer, actor, director. His use and development of Elizabethan theatre acting space. Objective analysis of how Shakespeare's text actually works on stage. Scene exercises to illustrate effective playing of the text.

#### \*3A. Contemporary Societies: History in Our Time (4) II. Brower

Lecture—4 hours. The Western World since the second World War covering the Cold War, European recovery, and the emergence of Socialist democracies, the spread of Communist regimes in Eastern Europe and their relations with the USSR, and the detente of the 70's. General Education credit: Contemporary Societies/Introductory.

#### \*3B. Society Through Literature: Modern Europe

(4) I. Wick

Lecture—3 hours; discussion—1 hour. Readings and discussion concerning European experience as related to the Russian revolution, two world wars, the rise of Fascism, Nazi holocaust, and the decline of Europe as the center of world politics. General Education credit: Civilization and Culture/Introductory.

#### \*3C. Society Through Literature: Modern China

(4) II. Gibbs

Lecture—3 hours; discussion—1 hour. China's twentieth-century experience: national humiliation, invasion, isolation, oppression, and the overthrow of ancient values, as reflected in short stories, novels, poetry, and film. General Education credit: Civilization and Culture/Introductory.

#### 3D. Contemporary Societies: Speech, Privacy, and Conscience (4) II. Crockerberg

Discussion—4 hours. Analysis of the constitutional rights of speech, privacy, and conscience as limits on majoritarian decision-making. Specific topics to be covered include pornography, "hate" speech, broadcast codes, book censorship, sexual and associational privacy, abortion, and euthanasia. General Education credit: Contemporary Societies/Introductory.

#### 3E. Contemporary Societies: Sociology (4) III.

Hackett

Lecture—2 hours; discussion—2 hours. Introduction to modern sociological research and theory utilizing material drawn from three topical areas: the development of gender identities, the social production of scientific and other forms of knowledge, and the social basis of religious belief. General Education credit: Contemporary Societies/Introductory.

#### 8. Colloquium (1) I, II, III. The Staff (N. McGuinness in charge)

Discussion—1 hour. Lectures, films, and readings on the interrelation between the arts and sciences. May be repeated for credit. (P/NP grading only.)

#### 8A. Special Topics in Natural Science and Mathematics (4) II, III. The Staff

Lecture—3 hours; discussion—1 hour. Group study of a special topic in natural sciences and mathematics. Course varies with topic offered. Limited enrollment. May be repeated for credit. General Education credit: Nature and Environment/Introductory.

#### 8B. Special Topics in Humanities (4) I, II. The Staff

Lecture—3 hours; discussion—1 hour. Group study of a special topic in humanities. Course varies with topic offered. Limited enrollment. May be repeated for credit. General Education credit: Civilization and Culture/Introductory.

#### 8C. Special Topics in the Social Sciences (4) I, II, III. The Staff

Lecture—3 hours; discussion—1 hour. Group study of a special topic in social sciences. Course varies with topic offered. Limited enrollment. May be repeated for credit. General Education credit: Contemporary Societies/Introductory.

#### 9. Seminar (1) I, II, III. The Staff (N. McGuinness in charge)

Lecture—1 hour. Lectures, films, and readings on the themes for the year. May be repeated for credit. (P/NP grading only.)

## Internal Medicine

### See Medicine, School of

## International Agricultural Development

(College of Agricultural and Environmental Sciences)

### The Major Program

Today there is a need for trained individuals who can translate and apply recently developed agricultural knowledge and technology to problems of food production, nutrition, health, income generation, marketing, and asset redistribution in less developed nations. Students interested in contributing to the solution of these problems associated with world hunger and health, as well as growth with equity, may wish to investigate the major in International Agricultural Development. Courses in International Agricultural Development are taught by faculty with extensive experience in developing nations.

The International Agricultural Development major provides opportunities to develop competence in a technical field in agriculture or a social science specialization, and, in addition, to acquire those special qualities of mind and spirit requisite for effective performance in underdeveloped and developing areas of the world. For a career in International Agricultural Development, you must be perceptive, sensitive, tolerant and understanding, and possess knowledge of the social-political-economic-cultural relationships which characterize developing societies and economies. Graduates concerned with issues and problems in international development may find job opportunities in government service, in private voluntary organizations, with commercial and consultant firms, and in multinational development companies working over seas.

### B.S. Major Requirements:

(For convenience in program planning, the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

	UNITS
<b>Written/Oral Expression</b> .....	7-8
See College requirement .....	7-8
<b>Preparatory Subject Matter</b> .....	42-48
(Choose either Social Sciences or Natural Science core)	
<b>Social Sciences core</b>	
Chemistry (Chemistry 1A, 1B).....	10
Computer science (Computer Science Engineering 10).....	3
Science (Biological Sciences 10, Plant Science 2, Animal Science 1, Nutrition 10, Soil Science 10) .....	15
Social sciences (Applied Behavioral Sciences 1, Anthropology 2, Political Science 2, Sociology 1, History 4C) .....	16
Statistics (Agricultural Science and Management 150).....	4
<b>Natural Science core</b>	
Biological sciences (Animal Science 2, Biological Sciences 1A, 1B, 1C, Genetics 100, Plant Science 2).....	15
Chemistry (Chemistry 1A, 1B, 8A, 8B)....	16
Mathematics (Mathematics 16A or 21A).....	3-4
Physics (Physics 6A).....	4
Statistics (Agricultural Science and Management 150).....	4
<b>Breadth/General Education</b> .....	6-24
Satisfaction of General Education requirement	
<b>Depth Subject Matter</b> .....	39
International Agricultural Development 10, 110A, 110B .....	9
International agricultural development	

(International Agricultural Development 101, 102, 103, 141, 190, 191, 195, 198).....	12
Economics and social sciences: Economics 1A-1B and two upper division courses relevant to development (Agricultural Economics 100A, 100B, 106, 113 or 136, 140, 145, 150, 157, 176; Economics 100, 100M, 110A, 115A, 115B, 118).....	18
<b>Primary Field of Specialization</b> .....60	
<i>Natural Sciences or Social Sciences:</i>	
Courses chosen by student, with an adviser in that specialization, to include additional preparation required for a particular specialization, depth subject matter, and supporting disciplines.	
<i>Natural Sciences:</i> Student should include some course work in social sciences appropriate to the geographic area of personal interest (e.g., anthropology, geography, history, or political science area studies courses).	
<b>Unrestricted Electives</b> .....1-26	
Students not possessing a reading/speaking ability in a foreign language will be encouraged to use these electives for language study or to attend an intensive language school.	
<b>Total Units for the Degree</b> .....180	

#### Specialization Advisers

A listing of faculty in the various areas of specialization and with interests in International Agricultural Development is available from the Major Adviser.

**Major Adviser.** S. B. Brush (*Applied Behavioral Sciences*).

### Minor Program Requirements:

	UNITS
<b>International Agricultural Development</b> .....20	
International Agricultural Development 10, 101, 102, 103, 110A, 110B .....16	
Minimum of four units chosen from International Agricultural Development 141, 190, 195, Economics 115A-115B, Vegetable Crops 150, Agronomy 100, 111 .....4	

**Minor Adviser.** S. B. Brush (141 AOB 4).

**Graduate Study.** A program of study and research leading to the M.S. degree is available in International Agricultural Development. Detailed information regarding graduate study may be obtained by writing to the Coordinator of Graduate Recruitment (I.A.D.), Graduate Division, UC Davis.

**Graduate Advisers.** S.B. Brush, (*Applied Behavioral Sciences*); D.J. Boyd (*Anthropology*); K.G. Cassman (*Agronomy and Range Science*); L.S. Jarvis (*Agricultural Economics*).

**Related Courses.** See Agricultural Economics 148, 215C; Agronomy 111; Animal Science 160; Anthropology 221; Economics 115A-115B, 118, 215A-215B-215C; Geography 142; Nutrition 20; Sociology 144; Vegetable Crops 150.

### Courses in International Agricultural Development

Questions pertaining to the following courses should be directed to the instructor or to the Department of Applied Behavioral Sciences, Advising Center in AOB 4 (916-752-2244).

#### Lower Division Courses

##### 10. Introduction to International Agricultural Development (4) II. Brush

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. General Education credit: Contemporary Societies/

Non-Introductory. Recommended GE preparation: Economics 1A-1B or Anthropology 2.

##### 92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)

Field placement—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)

#### Upper Division Courses

##### 101. Tropical Crop Agriculture (4) II. Buddenhagen (Agronomy and Range Science)

Lecture—4 hours. Prerequisite: Plant Science 2 or Biological Sciences 1C, and Soil Science 100 or Agronomy 100. Environment and management factors affecting plant agriculture and farming systems in the tropics. Crops are considered in relation to shifting cultivation, rice-based cropping systems, annual cropping, polycropping and monoculture of perennial species.

##### 102. Livestock and Poultry in Developing Nations (4) I. Vohra (Avian Sciences)

Lecture—4 hours. Animal production and problems of specific countries in Asia, Africa, and South America; feed resources, pests, diseases and their control; kinds of animals, domestic, wild and fish suited to these areas; uses of animals for draft and for food.

##### 103. Social Change and Agricultural Development (4) III. Brush

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.

##### 110A. Agricultural Development: Production (3) I. Parks

Lecture—3 hours. Prerequisite: upper division standing and an agricultural production course. Organization and utilization of human and natural resources in low income countries to produce food and fiber for consumption and trade. Emphasis is on farm management.

##### 110B. Agricultural Development: Marketing (3) II. Parks

Lecture—3 hours. Prerequisite: course 110A or consent of instructor. Postharvest handling, storage, transportation, processing and trade of agricultural products in low income countries. Emphasis upon food marketing systems and development projects.

##### \*141. Technology for Agriculture in Developing Regions (3) I. Chancellor (Agricultural Engineering)

Lecture—2 hours; laboratory-discussion—2 hours. Prerequisite: Physics 1A; upper division standing. Equipment used in tropical agriculture. Man-, animal-, and engine-powered devices. Energy requirements, size-scale, costs, support infrastructure development, and productivity potentials. (Same course as Agricultural Engineering Technology 141.)

##### 190. Proseminar in International Agricultural Development (1) I. Parks; II. The Staff

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.)

##### 191. Topics in International Agricultural Development (3) I, II, III. The Staff

Lecture-discussion—3 hours. Prerequisite: consent of instructor. Selected topics dealing with current issues in agricultural development in lesser developed nations—variable content. May be repeated for credit.

##### 192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)

Field placement—3-36 hours. Prerequisite: consent of instructor. Supervised internship, off and on campus, in community and institutional settings. (P/NP grading only.)

##### 195. Field Study in Mexican Agricultural Development (3) III. Parks

Field trip—8 days; seminar—four 2-hour sessions. Prerequisite: prior enrollment with consent of instruc-

tor required. Knowledge of Spanish not required. Observation of agricultural development strategies and impact on Northwestern Mexico. Discussion with farmers and agency staff members. Study of unique Mexican institutional arrangements and experiences in dealing with agricultural development problems. United States influences on Mexican agriculture. (P/NP grading only.)

##### 198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

##### 199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

#### Graduate Courses

##### 200. Analysis and Determinants of Cropping Systems (4) III. Cassman (Agronomy and Range Science)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 101, Agricultural Science and Management 150 (or comparable statistics course). Cropping systems as a function of farmer objectives, resource availability, environment, and yield potential; interactions among management strategies, resource use efficiency, and the agroecosystem; stability, diversity, and sustainability of cropping systems.

##### 201. The Economics of Small Farms and Farming Systems (4) II. Jarvis

Lecture—3 hours; discussion—1 hour. Prerequisite: Agricultural 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.

##### 202. Social Systems and Agricultural Development (4) I. Brush

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division course work in economic development, cultural anthropology, sociology, or political science (especially comparative politics or public administration), or consent of instructor. Social and cultural factors in agricultural and rural development; adaptation of rural people to development process; agrarian movements and revolution; evaluation of theories of rural development; application of social analysis to design and implementation of rural and agricultural policies and programs.

##### 203. Management Systems for Agricultural Development (4) II. Wolf (Graduate Group Chairperson in charge)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 200 or 201 preferably, or 202; or consent of instructor. Contexts of agricultural and rural development; strategies for program implementation; planning, staffing, and financing agricultural development; processes and structures of implementation; delegation, decentralization, devolution, deconcentration, and dispersal.

##### 220. Food and Nutrition Strategies in Developing Countries (3) II. Jarvis

Lecture—2 hours; discussion—1 hour. Prerequisite: Agricultural Economics 100A. Identifies important topical problems in food and nutrition policy, develops theoretical frameworks suitable for their analysis, examines the empirical information relevant to the problems and, using theory data, draws appropriate policy implications. Offered in even-numbered years.

##### 290. Seminar in International Agricultural Development (1-2) I, II, III. The Staff

Seminar—1-2 hours. Prerequisite: consent of instructor. Discussion and critical evaluation of advanced topics and issues in international agricultural development. (S/U grading only.)

##### 291. Topics in International Agricultural Development (3) I. The Staff; III. Parks

Lecture—3 hours. Prerequisite: consent of instructor. Selected topics dealing with current issues in agricultural development in lesser developed nations. Variable content. May be repeated once for credit.

**292. Graduate Internship** (1-12) I, II, III. The Staff 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.)

**298. Directed Group Study** (1-5) I, II, III. The Staff (Graduate Group Chairperson in charge) (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Graduate Group Chairperson in charge) (S/U grading only.)

## International Agricultural Development (A Graduate Group)

Lovell S. Jarvis, Ph.D., Chairperson of the Group  
Group Office, 106 AOB 4 (916-752-0770/1926)

**Faculty.** The Group includes faculty from the Colleges of Agricultural and Environmental Sciences, Engineering, and Letters and Science, and the School of Veterinary Medicine.

**Graduate Study.** The International Agricultural Development M.S. degree program prepares U.S. and foreign students for careers in agricultural and rural development around the world. Many of its faculty members have had worldwide experience in international development.

The philosophy guiding the IAD program is that graduates must have strong preparation in a specific field within the agricultural and social sciences. Thirty different specializations are offered. In addition, to apply their specializations in developing nations, graduates should be perceptive and understanding of people, and have a comprehension of how technological, social, economic, and political variables affect the development process. They should have insight into individual and group motivations and be able to discern ways to initiate changes.

The IAD program provides a multidisciplinary education designed in recognition of these needs. It guides students to the knowledge, skills, and abilities needed to stimulate, assist, or manage agricultural development and enhance rural life in developing countries. Students are prepared to accomplish technological and biological improvement in agricultural methods and to encourage social innovations where appropriate.

**Graduate Adviser.** Contact the Group Office.

## International Relations

(College of Letters and Science)  
Miroslav Nincic, Ph.D., Program Director  
Program Office, 351 Voorhies Hall (916-752-3063)

### Committee in Charge

Michael R. Caputo, Ph.D. (*Agricultural Economics*)  
Dennis J. Dingemans, Ph.D. (*Geography*)  
Joyce K. Kallgren, Ph.D. (*Political Science*)  
Michèle Praeger, Ph.D. (*French*)  
Young-Kwan Yoon, Ph.D. (*Political Science*)

### The Major Program

Cultural, economic, and political ties bind the world together more closely today than ever before. Problems of security, human rights, energy and mineral

resources, and the environment are increasingly confronted at a global, rather than a national level. The challenge of world politics and the growth of international business have created opportunities for individuals with a background in international affairs. With its theoretical models and real-world application, the study of International Relations has become an exciting, rapidly expanding, and highly relevant interdisciplinary major.

The International Relations Program at UC Davis provides a comprehensive approach to the study of today's complex world. This flexible and diverse undergraduate major is the only one of its kind in the nine-campus University of California system.

Graduation with a major in International Relations requires completion of introductory courses in political science, economics, geography, and history. Upper division work is composed of a core of four courses in economics and political science required of all majors, and an additional set of eight courses chosen from one of four clusters which encompass major topical areas in combination with regional emphases: I. World Trade and Development, II. International Relations of the Third World, III. Global Resources and Environment, IV. World Politics.

The major requires fluency in English and a working knowledge (approximately 24 to 27 units of course credits or equivalent fluency) of one other modern language of major significance in international affairs. Students may substitute another foreign language only with International Relations Program Committee approval.

One program of special interest to International Relations majors is the Education Abroad Program ("junior-year abroad"). Students of international affairs have found EAP an invaluable experience, providing insights into the life and culture of other countries.

Students may obtain academic credit for internships under the sponsorship of the International Relations Program Committee. The work-learn program assists students in obtaining internships for academic credit related to their field of study. Legislative, legal, and business internships have proved to be the most popular among International Relations students. The "Davis in D.C." program arranges summer internships in Washington, D.C.

International Relations gives the student a wide range of opportunities for advanced study and for careers in agencies of the federal government—in the U.S. or abroad, state agencies, international or nongovernmental organizations, foundations, newspapers and companies with interests in international business, trade, or finance. The stringent language requirement of the major program enhances career prospects in jobs which demand knowledge of the language and culture of other countries.

### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....24-52	
Economics 1A, 1B.....10	
Political Science 3.....4	
Geography 10.....3	
History 4C.....4	
One course selected from Anthropology 2, Environmental Studies 30, Geography 2, History 4B, 9A, 9B, 10, 15, 17C, International Agricultural Development 10, Political Science 1, 2.....3-4	
Approximately 24 to 27 units (or the equivalent) in one modern foreign language .....0-27	
Recommended: one course in statistics (e.g., Sociology 46A, 46B, Statistics 13)	
<b>Depth Subject Matter</b> .....48-50	
Economics 115A or 115B.....4	
Economics 160A-160B (Cluster I) or 162 (Clusters II, III, IV) .....4-8	
(Cluster I students: note prerequisites for courses 160A-160B.)	
Political Science 123.....4	
Political Science 130.....4	

Cluster emphasis.....32  
Choose one from the four clusters shown below. Courses must be in addition to those applied toward requirements above.

**Total Units for the Major** .....72-102

### Course List for Cluster Emphasis

#### **Cluster I: World Trade and Development**

(Heavy economic emphasis; suitable particularly for students who seek careers in international business or international organizations)

Economics 100

Economics 101

Economics 160A-160B

Economics 160A fulfills one core requirement; Economics 160B fulfills a cluster requirement.

One course to be selected from:

Economics 115A or 115B (whichever course is not used to fulfill the core requirement above), 118

Two courses to be selected from:

Anthropology 122, 126, 131, 135  
Geography 141, 142  
Political Science 124, 178  
Sociology 139, 141, 144, 145A

Two regional courses from Group A (History)

#### **Cluster II: International Relations of the Third World**

(Provides students with an opportunity to concentrate on problems of development of the Third World in recent times)

One course to be selected from each of four subjects:

Anthropology 123, 124, 126, 127, 131, 135

Sociology 118, 139, 141, 145A

Political Science 124, 126, 127, 128, 178

Economics 110B, 115A or 115B (whichever course is not used to fulfill the core requirement above), 116

Four regional courses focused on Third World:

Select two courses from Group A (History)

Select two courses from Group B (Anthropology, Economics, Geography, Political Science, and Sociology)

#### **Cluster III: Global Resources and Environment**

(Designed to familiarize students with major patterns of resource distribution in the world and the role resources play in international affairs)

Three courses to be selected from:

Agricultural Economics 176

Economics 123

Environmental Studies 100, 101

Geography 160

Political Science 107

Resource Sciences 100

Two additional courses to be selected from two of the following groups:

Energy—Agricultural Economics 169, Geology 130, Political Science 171

Food Resources—Geography 142, 175, Sociology 144

Population—Sociology 170

Rural Development—Anthropology 126, 131, 133, 135

Urbanization—Anthropology 127, Geography 156, Sociology 143A, 145A

Water Resources—Geography 162, Geology 116

Three regional courses:

Select two courses from Group A (History)

Select one course from Group B (Anthropology, Economics, Geography, Political Science, and Sociology)

#### **Cluster IV: World Politics**

(Examines political relationships in international relations. The focus is on national governments and their activities in the global political system)

One course to be selected from: Political Science

120, 121,

Two courses to be selected from:

Economics 116

History 145, 146A, 146B, 147A, 147C

Political Science 112, 128, 132, 140,

177, 178

Sociology 119, 157, 165A

One course to be selected from:

Anthropology 123

Geography 143

Philosophy 117

Sociology 118

Four regional courses:

Select two courses from Group A (History)

Select two courses from Group B (Anthropology, Economics, Geography, Political Science, and Sociology)

#### Regional Courses—Group A

History 115A, 115B, 115C, 137C, 141, 143, 144, 145,

146A, 146B, 151D, 155A, 155B, 155C, 161B,

163B, 165, 166B, 168, 174B, 174C, 190C, 193,

194C, 195, 196B (History 102 with advance

approval by faculty adviser; History 145, 146A, and 146B may be offered only once toward the major)

#### Regional Courses—Group B

Anthropology 131, 140A, 140B, 142, 144, 147, 148B,

149

Economics 170, 171, 172, 173

Geography 122A, 122B, 123, 124, 125A, 125B, 126,

127

Political Science 131, 133, 134, 136, 137, 138, 141,

146, 148A, 148B, 148C, 149, (Political Science 129, 139, 179 with advance approval by faculty adviser)

Russian 131

Sociology 147

**Major Adviser.** M. Nincic (*Political Science*).

### Courses in International Relations

#### Lower Division Courses

**98. Directed Group Study** (1-5) I, II, III.

Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III.

Prerequisite: consent of instructor. (P/NP grading only.)

#### Upper Division Courses

**190. Topics in International Relations** (4) I, II, III.

Lecture-discussion—4 hours. Prerequisite: consent of instructor. Selected topics in international relations. Variable content. May be repeated for credit when a different topic is studied.

**192. International Relations Internship** (1-12) I, II, III. The Staff (Committee Chairperson in charge)

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.)

**198. Directed Group Study** (1-5) I, II, III.

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

### Internship Program

Lawrence B. Coleman, Ph.D., Director

The Internship and Career Center 2nd Floor, South Hall (916-752-2855)

#### Program Areas

*Agricultural and Environmental Sciences*

Joe J. Stasulat, Program Manager

*Education and Graduate Placement*

Marg Lee, Coordinator

Kathi Shull, Coordinator

*Engineering and Physical Sciences*

Kevin T. Bennett, Program Manager

*Health and Biological Sciences*

Linda R. Hughes, Program Manager

*Liberal Arts*

Donald J. Hagerty, Program Manager

### 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 academic credit and *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 84 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)

JoAnn Cannon, Ph.D., Program Director

Department Office (French and Italian), 516 Sproul Hall (916-752-0830)

#### Faculty

JoAnn Cannon, Ph.D., Associate Professor

Alfonso De Petris, *Dottore in Filosofia*, Professor

Dennis J. Dutschke, Ph.D., Professor; Director,

EAP—Padua, Italy

Gustavo Foscariini, M.A., Lecturer

Juliana Schiesari, Ph.D., Assistant Professor

#### The Major and Minor Programs

The major in Italian is intended to provide a solid language background which will enable the student to pursue specific international job opportunities and to develop an appreciation for Italian language and culture. The program of Italian studies at UCD is small and geared to the individual needs of the student. A full range of courses is offered which satisfies the humanities and fine arts area requirement. The use of Italian is stressed on all levels and a knowledge of the language is required for literature courses which are taught only in Italian. Also offered are literature courses in translation which are intended for those students not majoring in Italian. A course on Italian culture and civilization is also taught in English. A degree in Italian provides a well-rounded liberal arts background for graduate studies in the humanities and for a wide range of careers in such areas as civil service, business, travel, library science, and

education. Above all, however, it gives the student an opportunity to read some of the greatest literature ever written and to study a country and people which have a uniquely rich culture and history.

A minor in Italian is available to those aware that a knowledge of foreign languages is of vital importance in today's increasingly international world. In every sector of society, language skills enhance our chances of getting jobs and successfully keeping them. In a more general sense, our understanding and appreciation of other cultures is dependent on our ability to perceive them clearly; there is no better means of perceiving a foreign culture than through its own language. Specific career opportunities for those students who have a background in foreign languages are abundant. In addition to the Foreign Service, jobs are available in business and education, both overseas and in the U.S. For example, those wishing to live (for brief or longer periods of time) and work in Italy have a choice of cities: Milan for business, Rome for international concerns in agriculture and nutrition in the F.A.O., and Florence for retail commerce and the arts, just to name a few. In the U.S., foreign-owned companies or American companies with interests in the foreign market need qualified people who are also fluent in a foreign language.

The Italian Program actively participates in the Education Abroad Program, the International Internships Program, and the Summer Sessions International (Naples), all of which offer opportunities for travel and study in Italy.

#### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b>	<b>0-24</b>
Italian 1, 2, 3, 4, 5, and 9 (or the equivalent)	0-24

<b>Depth Subject Matter</b>	<b>36</b>
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Italian 101 and either 102 or 104 .....8

Upper division courses in literature, taught in the language .....28

Must include at least one course from each of the following literary periods:

(a) Early Italian, (b) Renaissance and Baroque, (c) Eighteenth through Twentieth Centuries.

A total of 8 units in literature may be replaced by Italian 107 (highly recommended) and/or by courses in related fields such as history, art history, and music.

*Note: All upper division courses are to be chosen in consultation with the major adviser.*

<b>Total Units for the Major</b>	<b>36-60</b>
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#### Recommended

One year of college Latin or a Romance Language.

**Major Adviser.** G. Foscariini.

#### Minor Program Requirements:

	UNITS
<b>Italian</b>	<b>20</b>

Language, Italian 101 and either 102 or 104 .....8

Literature, three courses chosen in consultation with major adviser .....12

One course chosen from each of the following three areas: (a) Early Italian Literature, (b) Renaissance and Baroque, and (c) Eighteenth through Twentieth Centuries. (One of the above courses may be replaced by course 107 or by a course of literature in translation offered by the Italian Program).

**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 Program Director.

**Honors and Honors Program.** The honors program comprises two quarters of study under course 194H,

which will include a research paper and a comprehensive examination. See also sections on University and College requirements.

**Teaching Credential Subject Representative.** See Major Adviser above and also the section on the Teacher Education Program in this catalog.

## Courses in Italian

### Lower Division Courses

Students offering high school language preparation as a prerequisite must take a placement test.

**1. Elementary Italian (5) I, II, III.** Foscarini in charge. 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.)

**2. Elementary Italian (5) I, II, III.** Foscarini in charge. Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in areas of grammar and basic language skills.

**3. Elementary Italian (5) I, II, III.** Foscarini in charge. Lecture-discussion—5 hours. Prerequisite: course 2. Continuation of grammar sequence, and practice of all language skills through cultural texts.

**4. Intermediate Italian (3) I, II, III.** Director in charge. Lecture-discussion—3 hours. Prerequisite: course 3 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.

**5. Intermediate Italian (3) I, II, III.** Director in charge. Lecture-discussion—3 hours. Prerequisite: course 4 or the equivalent. 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.

**8A. Italian Conversation (3) I, III.** The Staff. Discussion—3 hours. Prerequisite: course 3 or the equivalent. Course designed to offer practice in speaking Italian. May be repeated once for credit. (P/NP grading only.)

**8B. Italian Conversation (3) II.** The Staff. Discussion—3 hours. Prerequisite: course 8A. Course designed to offer practice in speaking Italian. (P/NP grading only.)

**9. Reading Italian (3) I, II, III.** Director in charge. Lecture-discussion—3 hours. 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, as well as a means of strengthening the student's command of the Italian language.

**25. Italian Literature in Translation (3) II.** The Staff (Program Director in charge). Lecture—1 hour; discussion—2 hours. Course intended to acquaint the non-major with representative examples of Italian literature. Selected topics will include major authors, genres, literary periods, movements, or special themes.

**50. Studies in Italian Cinema (4) II.** Cannon. Lecture—2 hours; discussion—1 hour; term paper. 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. General Education credit: Civilization and Culture/Introductory.

**98. Directed Group Study (1-5) I, II.** The Staff. Primarily intended for lower division students. (P/NP grading only.)

### Upper Division Courses

#### 101. Advanced Conversation, Composition, and Grammar (4) I. De Petris

Lecture—3 hours; weekly essays. Prerequisite: course 9 or consent of instructor.

#### 102. Advanced Conversation, Composition, and Grammar (4) II. De Petris

Lecture—3 hours; weekly essays. Prerequisite: course 101 or consent of instructor.

#### 104. Italian Translation and Style (4) III. Dutschke

Lecture-discussion—3 hours; two research papers; term paper. Prerequisite: course 101 or 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.

#### 107. Survey of Italian Culture and Institutions (4) III. Foscarini

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.

#### \*109. The Image of Man in the Italian Renaissance (4) III. De Petris

Lecture—3 hours; term paper or oral presentation. Prerequisite: course 9 or consent of instructor. Process of progressive naturalization of the concept of man and emphasis upon different perspectives of human autonomy, self-determination and scientific "curiosity," in three parts: (a) Renaissance man and his environment; (b) philosophical thought: the adversary evaluation of the concept of Man; (c) prose and poetry.

#### 112. Medieval and Renaissance Poetry: St. Francis to Petrarch (4) I. Dutschke

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 9 or 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.

#### 113. Dante Alighieri, *Divina Commedia (Inferno, Purgatorio, Paradiso)* (4) III. Dutschke

Lecture—2 hours; discussion—1 hour; term paper—1 hour. Prerequisite: course 9 or 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.

#### 114. Boccaccio, *Decameron*, and the Renaissance Novella (4) II. Dutschke

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: course 9 or 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.

#### \*115A. Italian Literature of the Renaissance and the Baroque: from Humanism to Machiavelli (4) I. De Petris

Lecture-discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development of the Renaissance ideal of man and the subsequent loss of faith in this ideal as evidenced in the work of Lorenzo de' Medici, Poliziano, Ariosto and Machiavelli.

#### \*115B. Italian Literature of the Renaissance and the Baroque: from Cellini to Marino (4) III. De Petris

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 excursion on Galileo's role in the formation of a modern literary standard.

#### \*118. Italian Literature of the Eighteenth Century (4) I. De Petris

Lecture-discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Development

of modern Italian literature. Emphasis on the work of Goldoni, Bettinelli, Baretti, Parini, Alfieri and Vico.

#### \*119. Italian Literature of the Nineteenth Century (4) II. De Petris

Lecture-discussion—3 hours; term paper. Prerequisite: course 9 or consent of instructor. Romanticism in Italy, Manzoni, Verga, and Verismo.

#### 120A. Italian Literature of the Twentieth Century: The Novel (4) III. Cannon

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.

#### 120B. Italian Literature of the Twentieth Century: Poetry and Drama (4) I. Cannon

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.

#### 139B. Italian Literature in English: Boccaccio, Petrarch and the Renaissance (4) II. Dutschke

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.

#### \*139C. Italian Literature in English: Modern Italian Literature (4) III. Cannon

Lecture-discussion—3 hours; term paper. The Romantic Movement in Italy in its relationship to European Romanticism with emphasis on Foscolo, Leopardi, and Manzoni (offered in even-numbered years); twentieth-century Italian authors: differing emphasis according to the needs of the students.

#### 140. Italian Literature in English Translation: Dante, *Divine Comedy* (4) I. Dutschke

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: either English 3, Comparative Literature 2, or Medieval Studies 20B. Reading of Dante Alighieri's *Divine Comedy*, through the otherworld realms of Inferno, Purgatory, and Paradise. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

#### 142. Masterpieces of Modern Italian Narrative (4) III. Cannon

Lecture—1 1/2 hours; discussion—1 1/2 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 even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: English 3, Comparative Literature 2, History 4C.

#### 145. Special Topics in Italian Literature (4) I, II, III. The Staff (Director in charge)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 9 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 changes.

#### 192. Italian Internship (1-12) I, II, III, IV. The Staff (Director in charge)

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.)

#### 194H. Special Study for Honors Students (5) I, II, III. The Staff

Prerequisite: open only to honors students. Guided research leading to an honors paper.

#### 197T. Tutoring in Italian (1-4) I, II, III. The Staff

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) I, II, III.**

Foscarini

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) I, II, III. The Staff (Director in charge)**

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Director in charge)**

Prerequisite: consent of instructor. (P/NP grading only.)

Kate M. Scow, Ph.D., Assistant Professor (*Soil Science*)

Roger H. Shaw, Ph.D., Professor (*Meteorology*)  
2 Wendy Kuhn Silk, Ph.D., Professor (*Water Science*)

Michael J. Singer, Ph.D., Professor (*Soil Science*)  
Su-Tzai Soong, Ph.D., Associate Professor (*Atmospheric Science*)

1 Randal J. Southard, Ph.D., Associate Professor (*Soil Genesis/Morphology*)

Harry O. Walker, Ed.D., Senior Lecturer Emeritus (*Resource Sciences*)

Bryan C. Weare, Ph.D., Professor (*Meteorology*)  
Lynn D. Whittig, Ph.D., Professor Emeritus (*Soil Science*)

Robert Zasoski, Ph.D., Assistant Professor (*Soil Science*)

*Veihmeyer Hall Faculty Office*  
113 Veihmeyer Hall (916-752-0453)

James W. Biggar, Ph.D., Professor (*Water Science*)  
Robert H. Burgi, M.S., Professor Emeritus (*Water Science, Civil Engineering*)

Lloyd D. Doneen, Ph.D., Professor Emeritus (*Water Science and Engineering*)

Graham E. Fogg, Ph.D., Associate Professor (*Geohydrology*)

Donald W. Grimes, Ph.D., Lecturer (*Water Science*)  
Mark E. Grismer, Ph.D., Associate Professor (*Water Science, Agricultural Engineering*)

Robert M. Hagan, Ph.D., Professor Emeritus (*Water Science*)

Delbert W. Henderson, Ph.D., Professor Emeritus (*Water Science*)

Jan W. Hopmans, Ph.D., Assistant Professor (*Water Management*)

Theodore C. Hsiao, Ph.D., Professor (*Water Science*)

Allen W. Knight, Ph.D., Professor (*Water Science*)  
Miguel A. Mariño, Ph.D., Professor (*Water Science, Civil Engineering*)

Donald R. Nielsen, Ph.D., Professor (*Soil and Water Science*)

Marc B. Parlane, Ph.D., Assistant Professor (*Water Science*)

Carlos E. Puente, Ph.D., Assistant Professor (*Hydrology*)

Frank E. Robinson, Ph.D., Lecturer (*Water Science*)  
Verne H. Scott, Ph.D., Professor Emeritus (*Water Science, Civil Engineering*)

Kenneth K. Tanji, M.S., Professor (*Water Science*)

Wesley W. Wallender, Ph.D., Associate Professor (*Water Science, Agricultural Engineering*)

## Japanese

### See Chinese and Japanese

## Land, Air and Water Resources

(College of Agricultural and Environmental Sciences)

André E. Läuchli, Ph.D., Chairperson of the Department

Michael J. Singer, Ph.D., Vice Chairperson of the Department

Department Office, 139 Hoagland Hall (916-752-1406)

### Faculty

*Hoagland Hall Faculty Office*  
139 Hoagland Hall (916-752-1406)

Daniel G. Aldrich, Ph.D., Professor Emeritus (*Soil Science*)

Francis E. Broadbent, Ph.D., Professor Emeritus (*Soil Microbiology*)

Richard G. Burau, Ph.D., Professor (*Soil Science, Environmental Toxicology*)

John J. Carroll III, Ph.D., Professor (*Meteorology*)

Kinsell L. Coulson, Ph.D., Professor Emeritus (*Meteorology*)

Randy A. Dahlgren, Ph.D., Assistant Professor (*Soil Mineralogist*)

C.C. Delwiche, Ph.D., Professor Emeritus (*Geobiology*)

Emanuel Epstein, Ph.D., Professor Emeritus (*Plant Nutrition, Botany*)

Robert G. Floccihini, Ph.D., Professor (*Resource Sciences*)

Richard D. Grotjahn, Ph.D., Associate Professor (*Atmospheric Science*)

Gordon L. Huntington, Ph.D., Lecturer Emeritus (*Soil Morphology*)

André E. Läuchli, Ph.D., Professor (*Plant Nutrition*)

Donald N. Munns, Ph.D., Professor (*Soil Science*)

Leonard O. Myrup, Ph.D., Professor Emeritus (*Meteorology*)

Terrence R. Nathan, Ph.D., Assistant Professor (*Atmospheric Science*)

1 Kyaw Tha Paw U, Ph.D., Associate Professor (*Atmospheric Science*)

H. Michael Reisemauer, Ph.D., Professor Emeritus (*Soil Science*)

Victor V. Rendig, Ph.D., Professor Emeritus (*Soils and Plant Nutrition*)

James H. Richards, Ph.D., Assistant Professor (*Plant Nutrition*)

Dennis E. Rolston, Ph.D., Professor (*Soil Science*)

Land, Air and Water Resources is a multidisciplinary department with faculty who specialize in atmospheric, plant, resource, soil and water science, and water engineering. Teaching and research focus on both agricultural 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, Resource Sciences, and Soil and Water Science.

**Advising Center** is located in 122 Hoagland Hall (916-752-1669).

**Graduate Study.** Four graduate programs, Atmospheric Science, Earth Sciences and Resources, Soil Science, and Water Science are administered by Land, Air and Water Resources.

**Courses.** See courses listed under Atmospheric Science, Earth Sciences and Resources, Resource Sciences, Soil Science, and Water Science.

**Graduate Study.** Graduate work offered in the area of resource sciences is Atmospheric Science, Earth Sciences and Resources, Soil Science, and Water Science. Detailed information can be obtained from graduate advisers for these areas and the *Graduate Announcement*.

## Landscape Architecture

(College of Agricultural and Environmental Sciences)

**Faculty.** See under Department of Environmental Design.

### The Major Program

This major prepares students for entrance into the profession of landscape architecture. Landscape architects are primarily involved in the planning and design of land areas where human use requires adaptation or conservation of the environment. 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, urban open spaces, energy-efficient neighborhoods, land reclamation projects, and landscape planning for wilderness and scenic regions, coastal and riparian environments, and other sensitive land areas. A process-oriented approach to design is stressed and environmental and community values are emphasized. Graduates may find jobs in private landscape architectural firms or public agencies 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.

Students are admitted to the Landscape Architecture major only after submitting a portfolio for review and selection by the faculty. Contact the Environmental Design Advising Center or the Landscape Architecture major adviser for further information.

### B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>50-58</b>
Biological sciences (Biological Sciences 1, 10) .....	4-5
Botany (Botany 2, Plant Science 2) .....	5
Chemistry (Chemistry 1A, 10) .....	4-5
Physics (Physics 1A, 6A, 10) .....	3-4
English (English 1, 20, 103) .....	4
Public speaking (Rhetoric and Communication 1) .....	4
Two-dimensional design (Art 16, Design 21, Engineering 4) .....	3-4
Three-dimensional design (Art 5, 121A, 142, Design 134A-C, 135, 180A, 180C) .....	4
Earth sciences (Geography 1, Geology 1, Soil Science 10) .....	3
Economics (Economics 1A, 1B, Agricultural Economics 147) .....	4-5
Computer science (Agriculture Science and Management 21, Engineering 5, Computer Science Engineering 10, 40) .....	3
Mathematics (Mathematics 16A, 36, Statistics 13, Agricultural Science and Management 150) .....	3-4
Social science (Anthropology 2, Geography 2, 5, Psychology 1, 16, Sociology 1) .....	3-5
Humanities elective .....	3
<b>Depth Subject Matter</b> .....	<b>70-74</b>
Introduction to landscape architecture (Landscape Architecture 40) .....	3
Landscape architecture studio: introduction, recreational open space, site planning (Landscape Architecture 111, 112, 113) .....	12
Landscape graphic communication (Landscape Architecture 121) .....	4

Advanced communication for landscape architecture (Landscape Architecture 122) .....	4
Introduction to landscape construction, site engineering, construction details and drawings (Landscape Architecture 131, 132, 133, 134) .....	15
History of landscape architecture (Landscape Architecture 140) .....	3
Introduction to environmental plants (Environmental Horticulture 6) .....	2
Taxonomy and ecology of environmental plants (Environmental Horticulture 105) .....	4
Arboriculture (Environmental Horticulture 133) .....	4
Plant selection for environmental design (Landscape Architecture 155) .....	3
Landscape planting design (Landscape Architecture 156) .....	4
Landscape architecture studio: planning and analysis, urban and community design (Landscape Architecture 181, 182) .....	8
Senior project in landscape architecture (Landscape Architecture 193) .....	1-5
Proseminar, three quarters (Landscape Architecture 190) .....	3
Internship (Landscape Architecture 192) recommended.	
<b>Breadth Subject Matter</b> .....	<b>17-21</b>
Resource sciences, two upper division courses with approval of adviser .....	6-8
Ecology (Environmental Studies 100, 110, Botany 117, Entomology 104, Zoology 114A, 114B, 125) .....	3-5
Environmental awareness (Psychology 144) .....	4
Related disciplines elective .....	4
Course to emphasize a discipline peripheral to landscape architecture (Environmental Biology and Management 110, 116, 122, 127, Environmental Studies 126, 161, 171, Agricultural Economics 18, Civil Engineering 1, Design 1)	
<b>Unrestricted Electives</b> .....	<b>27-43</b>
<b>Total Units for the Major</b> .....	<b>180</b>

**Advising Center** is located in 152 Walker Hall (916-752-1165).

**Graduate Study.** Refer to the Graduate Division section in this catalog.

## Courses in Landscape Architecture

### Lower Division Course

**11. Landscape Studio: Introduction** (4) II. The Staff  
Studio—8 hours. Prerequisite: courses 21 and 40 (may be taken concurrently). Introductory studio problems in landscape architectural design equally emphasizing exposure to design arts, human factors, and natural resource planning. Emphasis is placed on functional and aesthetic considerations for small scale projects.

**21. Landscape Drafting and Visualization** (4) I. The Staff  
Studio—8 hours. Prerequisite: course in free-hand drawing recommended. Development of idea expression through graphic media and the use of drawing instruments for visual representation including the methods of hand lettering, line quality, and perspective construction.

**31. Landscape Construction: Introduction** (3) III. The Staff  
Lecture—3 hours. Prerequisite: courses 11 and 40 (may be taken concurrently). Introductory analysis of materials and methods of technical landscape construction. Emphasis on structural, mechanical, electrical, functional, and aesthetic properties of materials and construction methods commonly used in landscape development.

**40. Introduction to Landscape Architecture** (3) I, II. Francis  
Lecture—3 hours. History, theory, philosophy, techniques and applications of landscape architecture and the analysis, planning, design, and management of outdoor spaces.

### Upper Division Courses

**111. Landscape Studio: Analysis, Function, and Process** (4) I. Thayer  
Studio—8 hours. Prerequisite: course 11. Studio problems in the analysis of site and functional relationships relating to landscape development. Emphasis on inventory and analysis of natural and cultural site features, microclimate effects, pedestrian/bicycle/vehicular circulation, and basic social needs and uses of outdoor space.

**112. Landscape Architecture Studio: Landscape Form, Design, and Art** (4) II. The Staff

Lecture-discussion—2 hours; laboratory—6 hours; field trips. Prerequisite: course 111; major in Landscape Architecture. Studio problems in design of landscapes and outdoor places which rely on visual, spatial, aesthetic, and symbolic characteristics.

**113. Landscape Architecture Studio: Site Planning** (4) III. The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 112. Open to Landscape Architecture majors only. Studio problems in analysis, planning, and design of intermediate-scale landscape developments involving the siting of structure, design of circulation systems, parking, open spaces, and outdoor facilities. Emphasis on residential, institutional, and commercial site planning for solar/energy conservation.

**120. Computer Graphics for Landscape Architects** (4) I. McNeil

Studio—8 hours. Prerequisite: course 21. Introduction to computer-aided design equipment and software applications, including computerized drafting, cut and fill calculations, road alignment, site engineering and landscape analysis.

**121. Landscape Graphic Communication** (4) II. The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 111. Studio work in graphic representation of landscapes and landscape architectural plans. Introductory work in sketching, rendering, lettering, sheet layout, color use, and presentation techniques relating to the professional practice of landscape architecture. Limited enrollment.

**122. Advanced Communication for Landscape Architecture** (4) III. The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 121. Open to Landscape Architecture majors only. Advanced concepts in multimedia and graphic presentation of landscape architecture projects, to include preparation of proposals, reports, audio-visual productions, and mixed-media presentations. Limited enrollment.

**131. Landscape Architecture: Principles of Practice** (3) I. The Staff

Lecture—3 hours. Prerequisite: course 31. Exposure to the legalities, expectations, and ethical standards of the profession of Landscape Architecture. Subject matter covers marketing, office management, liability, licensing, contracts and specifications, professional skills and project management.

**132. Landscape Construction: Site Engineering** (4) II. The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 131. Topographic and grading problems in landscape engineering: drainage plans, grading plans, spot elevations, road alignment, sections and profiles and cut and fill calculations. Limited enrollment.

**133. Landscape Construction: Details** (4) III. The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 132. Open to Landscape Architecture majors only. Advanced study of materials and methods in landscape construction. Emphasis on studio design

and integration of details and specifications. Limited enrollment.

**134. Landscape Construction: Drawings** (4) I. The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 133. Technical solution of an intensive landscape architectural design problem with emphasis on preparation of production drawings and construction implementation documents. Limited enrollment.

**140. History of Landscape Architecture** (3) III. McNeil

Lecture—3 hours. History of landscape architecture as an art form, technology, and profession. Emphasizes design of gardens and outdoor spaces from prehistoric civilizations to the present. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Art 1A, 1B, or History 3.

**155. Plants in the Cultural Environment** (3) III. Dawson

Lecture—3 hours. Prerequisite: Biological Sciences 10. Cultural parameters of selecting plants for use in environmental design and planning. Contemporary themes in climate, energy and resource conservation, low maintenance, aesthetics, edible landscapes, historic preservation, native plants, specialized gardens, and computerized plant selection. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10.

**156. Landscape Planting Design** (4) I. The Staff

Studio—8 hours. Prerequisite: course 111, 155, Environmental Horticulture 105. Application of aesthetic, functional, and horticultural principles to the composition of the planted landscape and the development of planting plans.

**159. Public Garden Management** (3) III. The Staff

Lecture—3 hours. Prerequisite: Biological Sciences 1C, Plant Science 2, or Environmental Horticulture 6. Management of the collections, facilities and programs of public gardens. Emphasis is placed on the management skills and operational techniques utilized in public gardens.

**181. Landscape Architecture Studio: Planning and Analysis** (4) I. The Staff

Studio—8 hours; two all-day field trips. Prerequisite: course 113. Landscape architecture studio to include the solution of large-scale landscape architectural problems with emphasis on landscape planning and analysis methods and environmental concerns. Limited enrollment.

**182. Landscape Architecture Studio: Urban and Community Design** (4) II. Francis

Studio—8 hours; two all-day field trips. Prerequisite: course 181. Solution of community and urban landscape design problems with emphasis on community and social processes, participatory design methods, and comprehension of behavioral factors relating to urban open space. Limited enrollment.

**183. Landscape Ecology** (4) I. Dawson

Studio—8 hours. Prerequisite: course 113 and Environmental Studies 100 or consent of instructor. Practical exercises in ecological design emphasizing conservation, habitat restoration, cultural impacts, and bioregionalism. Emphasis is placed on management techniques, restorative methodology, and physical land use planning.

**184. Sustainable Landscape Architecture** (4) II. The Staff

Studio—8 hours. Prerequisite: course 113 or consent of instructor. Planning and design of land areas for social and environmental stability creating sustainable landscapes which conserve water, energy, arable soil, and biological diversity.

**190. Proseminar in Landscape Architecture** (1) I, II, III. Thayer, Francis, McNeil

Seminar—1 hour. Lectures and discussion of critical issues in landscape architecture. May be repeated three times for credit. (P/NP grading only.)

**192. Internship in Landscape Architecture** (1-12) I, II, III. The Staff

Field experience. Prerequisite: senior standing in

Landscape Architecture major. Professional field experience in landscape architecture. May be repeated for a total of 12 units. (P/NP grading only.)

**193. Senior Project in Landscape Architecture (1-5) II, III. Francis**

Prerequisite: senior standing in Landscape Architecture major. Directed design/research of a significant landscape architectural project under supervision of instructor. May be repeated for credit. (P/NP grading only.)

**197T. Tutoring in Landscape Architecture (1-5) I, II, III. The Staff**

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) I, II, III. The Staff (Master Adviser in charge)**

Prerequisite: consent of instructor. Directed group study. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates in Landscape Architecture (1-5) I, II, III. The Staff (Master Adviser in charge)**

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**\*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. Offered in even-numbered years.

**202. Methods in Design and Landscape Research (4) II. McNeil**

Seminar—4 hours. Prerequisite: Statistics 102 or the equivalent; graduate standing or consent of instructor. 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. Offered in odd-numbered years.

**\*203. Environmental Perception and Aesthetics (4)**

Seminar—4 hours. Prerequisite: Psychology 144 or the equivalent; graduate standing or consent of instructor. Examines the perceptual and aesthetic response of humans to the physical environment and discusses the means by which intervention by design can affect human perception, cognition, aesthetic response, and, ultimately, human behavior. Offered in even-numbered years.

**204. Case Studies in Landscape Design and Research (4) II. Dawson**

Laboratory—8 hours. Prerequisite: contact department for prerequisite courses; graduate standing or consent of instructor. Case studies in landscape design and research have as their primary goal the exposure of the student to real-world, designed-environment situations where creative activity and/or basic research is the primary product. Offered in odd-numbered years.

**210. Advanced Landscape Architecture Studio (4)**

III. The Staff

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. Offered in odd-numbered years.

**220. Public Space and Culture (3) III. Francis**

Seminar—3 hours. Prerequisite: course 182 or the equivalent; graduate standing or consent of instructor. Explores the public environment of cities including their streets, parks, and squares. Public life and culture of American cities is examined and design

responses to this culture evaluated. Typology is used to identify spaces. Offered in odd-numbered years.

**\*240. Rural Landscape Planning and Design (3)**

Seminar—3 hours. Prerequisite: course 181 or the equivalent; graduate standing or consent of instructor. Addresses physical planning issues facing rural farmsteads, subdivisions, commercial zones, and small communities in their challenge of economic and social change. Concern is with runaway growth, shrinking populations, shifting economies, and lack of public funds or consensus. Offered in even-numbered years.

**250. Technology and Sustainable Landscape (3)**

III. The Staff

Seminar—3 hours. Prerequisite: course 184 or the equivalent; graduate standing or consent of instructor. Explores the relationship between technology and landscape quality. Typology of technological landscape adaptations is presented and impacts of these technologies are discussed. Emphasizes a theoretical understanding of technological change and a practical approach to sustainable technologies. Offered in odd-numbered years.

**\*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 even-numbered years.

**290. Graduate Seminar in Landscape Architecture (2) I, II, III. The Staff**

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.)

**297. Practicum in Landscape Architecture (1-10) I, II, III. The Staff**

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.)

**298. Group Study (1-5) I, II, III. The Staff**

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

**299. Directed Individual Research for Graduate Students (1-5) I, II, III. The Staff**

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

**Latin**

**See Classics**

**Law, School of**

Bruce J. Wolk, J.D., Acting Dean of the School

Mortimer D. Schwartz, J.D., LL.M., M.S., Associate Dean (Law Library)

Martha S. West, J.D., Associate Dean (Administration and Student Affairs)

Dean's Office, 1011 Martin Luther King, Jr. Hall (916-752-0243)

**Faculty**

Homer G. Angelo, J.D., LL.M., Professor Emeritus

John D. Ayer, J.D., LL.M., Professor

Edward L. Barrett, Jr., J.D., Professor Emeritus

Florian Bartosic, B.C.L., LL.M., Professor

Antonia E. Bernhard, J.D., Lecturer

Edgar Bodenheimer, J.U.D., LL.B., Professor Emeritus

Alan E. Brownstein, J.D., Professor

Carol S. Bruch, J.D., Professor

Garrett C. Dailey, J.D., Lecturer

Joel C. Dobris, LL.B., Professor

Harrison C. Dunning, LL.B., Professor

Daniel J. Dykstra, LL.B., S.J.D., Professor Emeritus

Floyd F. Feeney, LL.B., Professor

Daniel Wm. Fessler, J.D., S.J.D., Professor

Barbara A. Fitzmaurice, J.D., Lecturer

Arturo Gandara, J.D., Acting Professor

Michael J. Glennon, J.D., Professor

Gary Goodpaster, J.D., Professor

Sarah D. Gray, Ph.D., Professor (*Human Physiology*)

Robert W. Hillman, J.D., Professor

James E. Hogan, LL.B., Professor

Edward J. Imwinkelried, J.D., Professor

Margaret Z. Johns, J.D., Lecturer and Director of Legal Writing

Kevin R. Johnson, J.D., Acting Professor

Friedrich K. Juenger, J.D., Professor

Evelyn L. Kirkland, J.D., Acting Professor

Leslie A. Kurtz, M.A., J.D., Professor

Cecilia D. Lannon, J.D., Lecturer

Pierre R. Loiseaux, LL.B., LL.M., Professor

Jean C. Love, J.D., Professor

Arlene Mayerson, M.A., J.D., LL.M., Professor

John B. Oakley, J.D., Professor

Raymond I. Parnas, J.D., LL.M., S.J.D., Professor

Rex R. Perschbacher, J.D., Professor

John W. Poulos, J.D., Professor

Edward H. Rabin, LL.B., Professor

Mortimer D. Schwartz, J.D., LL.M., M.S., Professor

Daniel L. Simmons, J.D., Professor

James F. Smith, J.D., Lecturer

Martha S. West, J.D., Professor

Sidney Wolinsky, LL.B., Lecturer

Bruce A. Wolk, J.D., Professor

Richard C. Wydick, LL.B., Professor

**Courses of Instruction.** The following courses for students enrolled in the School of Law are set up for the semester-system basis only. Instruction dates can be found at the end of the School of Law section at the front of the catalog. The symbols are (I) for Fall Semester and (II) for Spring Semester.

**Courses in Law**

**Professional Curriculum**

**First Year Courses**

**200. Introduction to Law (1) I. Love**

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.)

**201A-201B. Property (2-2) I-II. Dobris, Kirkland**

Discussion—2 hours. 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. (Deferred grading only, pending completion of sequence.)

**202A-202B. Contracts (3-3) I-II. Fessler, Gandara, Imwinkelried**

Discussion—3 hours. Course examines 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—or fails to adjust—to changing social demands. (Deferred grading only, pending completion of sequence.)

**203A-203B. Civil Procedure (3-2) I-II. Hogan, Johnson, Oakley, Perschbacher**

Discussion—2-3 hours. Study of the fundamental and recurrent problems in civil actions including the

methods used by federal and state courts to resolve civil disputes. Among the topics covered are the relation between federal and state courts; the power of courts over persons, property, and subject matter (jurisdiction); the scope of litigation (joinder of claims and parties); preparation for trial through pleading, discovery, and pretrial; devices for resolving actions and issues before and during trial; functions of judge and jury; and the finality of the trial court's disposition. (Deferred grading only, pending completion of sequence.)

**204A-204B. Torts** (3-2) I-II. Kurtz, Juenger

Discussion—2-3 hours. Course in tort law is designed to familiarize the students with the legal concepts which apply to actions brought by litigants who seek relief for injury. It is concerned with intentional and unintentional invasions of personality and property. More specifically, the course seeks to analyze civil actions based upon wrongs such as assault, battery, false imprisonment, negligence, strict liability, defamation, invasion of privacy, and misrepresentation. Alternatives to the present tort compensation system are also considered. (Deferred grading only, pending completion of sequence.)

**205. Constitutional Law** (4) II. Brownstein, Glennon  
Discussion—4 hours. The principles, doctrines, and controversies regarding the basic structure of, and division of powers in, American government. In particular, it treats judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers between branches of the federal government. It also begins an examination, continued in course 218, of procedural and substantive constitutional rights and the limits they place on governmental action. Economic substantive due process, procedural due process, and rights of privacy and personal autonomy will also be addressed.

**206. Criminal Law** (3) I. Johns, Poulos

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** (1) I. Bernhard

Discussion-laboratory—1 hour. Description of the variety of sources of law and secondary authority. Instruction in their location and use. Graded on basis of weekly self-teaching research drills. No final examination.

**208. Legal Writing** (2) II. Bernhard, Johns, Smith  
Lecture—2 hours. Instruction in the form and substance of writing. A variety of law-related documents will be discussed and drafted. An experience in oral advocacy will be included. Graded on the basis of the writing and advocacy assignments. No final examination.

**Second and Third Year Courses**

The second- and third-year courses fall into subject areas as shown here

- (a) General courses: 209, 250, 258
- (b) Agricultural Law: 222, 229
- (c) Business Law: 210, 213, 214, 215, 228, 236, 241, 262, 269, 270, 274, 275
- (d) Commercial Law: 216, 237, 243
- (e) Constitutional Law: 217, 218, 288
- (f) Consumer Law: 253
- (g) Criminal Law: 227, 239, 276, 284, 290
- (h) Estate Planning: 221, 223, 294
- (i) Family Law: 225, 230, 234, 272, 273, 281
- (j) International Comparative and Foreign Law: 233, 248, 249, 257, 259, 266, 291
- (k) Labor Law: 251, 260, 271, 279
- (l) Procedure and Jurisdiction: 242, 246, 283, 295
- (m) Property and Environmental Law: 232, 255, 256, 264, 265, 282, 285, 287, 294
- (n) Public Law: 231, 235, 261, 293
- (o) Skills and Litigation: 211, 219, 263A, 263B, 278, 297, 410A, 410B, 413, 414
- (p) Taxation: 220, 238, 245, 247, 254
- (q) Topical Survey Courses: 212, 226, 240, 244, 252, 254, 266, 267, 268, 277, 280, 286, 289, 292, 296

- (r) Individual and Group Study: 298, 299, 416, 417, 418, 419
- (s) Clinical Programs: 420, 425, 440, 450, 455, 465, 470, 480, 495

**\*209. Legal Imagination** (2)

Discussion—2 hours; papers. Intended for students interested in extensive thinking and writing about the legal system and about their role as lawyers in the system. Students will be expected to write short weekly papers and engage in weekly group discussion of their work. Limited enrollment with preference given to third-year students. (S/U grading only.)

**\*210. Business Reorganization** (2) II.

Discussion—2 hours. Prerequisite: course 243 recommended. Focus is on businesses trying to survive when they are in substantial debt, exploring the structure of relief available under Chapter 11 of the Bankruptcy Code. Focus is on the goals of a troubled debtor and the strategies or options available to meet them.

**211. Negotiation and Dispute Resolution** (2) II.

Goodpaster

Seminar—2 hours. Course teaches negotiation, mediation, arbitration skills, and theories. Students will do five or more practice negotiations, mediations, or arbitrations to develop skills, perception, and personal style. Class discussion and theory development are based on these exercises. Limited enrollment.

**212. Law, Medicine, and Ethics** (2) I.

Discussion—2 hours. Legal, moral and economic analysis of problems posed or soon to be posed by advances in biomedical technologies. Includes examination of problems raised by: (1) behavior control through organic intervention, including psychosurgery, psychoactive drugs, and electrical stimulation of the brain; (2) genetic engineering; (3) amplification of human powers and faculties by artificial means, including organ transplantation, man-machine symbiosis, and pharmacologically-induced enhancement of mental functioning; (4) death and dying; and (5) regulation of experimentation with human subjects. In each area, discussion will include problems in distributive justice posed by limited availability of biotechnological commodities, as well as issues arising from enforced treatment.

**213. Business Organizations I** (3) I. Fessler

Discussion—3 hours. Focus on public issue corporation. Both statutory and judge-made legal principles of state corporate law, and federal regulation of the corporation will be studied. Corporate governance and the proxy voting system, insider trading, suits against corporations, regulation of the sale of securities and distribution of dividends, and the merger and acquisition of corporations will be covered.

**214. Business Organizations II** (3) II. Dykstra

Discussion—3 hours. Building upon the development of the public issue corporation in course 213, this course centers on the legal problems of a business owned by a few persons each of whom may seek to play an active role in the enterprise. Included within the survey are the problems of the "close corporation" and the alternatives to incorporation for persons in quest of profit. These alternatives include sole proprietorship, general and limited partnerships, and joint ventures. Related agency concepts are integrated into this material.

**215. Business Associations** (4) II. Hillman

Discussion—4 hours. Course provides a broad survey of the legal rules and concepts applicable to business associations, both public and closely held. Principal attention is given the corporate form of organization, although partnerships are also treated briefly. Topics surveyed include the planning of business transactions, the process of incorporation, the financing of corporations, the role of management and shareholders, the federal securities laws, and social responsibility.

**216. Commercial Law: Article 9** (3) I. Loiseaux

Discussion—3 hours. Prerequisite: course 243 recommended. Course covers security interests in personal property.

**217. Constitutional Law I** (3) I. Brownstein, Glennon, Poulos

Discussion—3 hours. This is a two-semester course. The first semester covers the principles, doctrines, and controversies regarding the basic structure of, and division of powers in, American government. In particular, it treats judicial review, jurisdiction, standing to sue, federalism, federal and state powers and immunities, and the separation of powers between branches of the federal government. Also begun is an examination, continued in the second semester, of procedural and substantive constitutional rights and the limits they place on governmental action.

**218. Constitutional Law II** (3) II. Brownstein, Poulos

Discussion—3 hours. Course principally covers the First Amendment and the Equal Protection Clause. The First Amendment study involves an examination of freedom of speech and assembly, focusing on the various kinds of speech the courts have identified and their constitutional significance: political speech, commercial speech, offensive speech, obscenity, fighting words, and speech constituting a clear and present danger. Attention will also be directed to issues involving the forum in which speech occurs: prior restraint, overbreadth, vagueness doctrine, and the protection provided symbolic expression. The equal protection study will examine suspect class doctrine involving discrimination on the basis of race, gender, alienage, and other characteristics, affirmative action, the problem of "invidious motive," state action, and the extent to which the equal protection clause prevents government from burdening the exercises of fundamental rights. If time permits, the Establishment Clause and the Free Exercise Clause will also be considered.

**219. Evidence** (4) I. Wydick; II. Hogan

Discussion—4 hours. The rules regarding the admissibility of testimonial and documentary proof during the trial of civil and criminal cases, including the concept of relevancy, the hearsay rule, the examination and impeachment of witnesses, the opinion rule, constitutional and statutory privileges.

**220. Federal Income Taxation** (4) I. Simmons; II. Wolk

Discussion—4 hours. Introduction to basic principles of federal income taxation. Topics include identification of income subject to tax, gains and losses from property transactions, deductions from income, the timing of income and deductions (tax accounting), and the identity of persons subject to tax on particular items of income.

**221. Trusts, Wills and Decedents' Estates** (3) I. Dobris; II. Kirkland

Discussion—3 hours. Study of the law of wills and trusts. Course coverage includes: intestate succession; family protection and limits on the power of testation; execution, revocation and revival of wills; contracts to make wills; will substitutes; intervivos and testamentary private trusts. Depending on the instructor the course may also cover one or more of the following topics: class gifts; powers of appointment; the Rule Against Perpetuities; and introduction to the administration of estates and trusts, including powers, duties, rights and liabilities of fiduciaries and the management of assets.

**222. Agricultural Law** (3)

Discussion—3 hours. Exportation and importation of agricultural products will be covered, including tariffs, quotas, and non-tariff barriers, the General Agreement on Tariffs and Trade (the GATT), United States trade legislation (escape clause, and antidumping and countervailing duties) and the General System of Preferences. The trading regimes of America's major agricultural trading partners, the European Community, Canada (the agricultural aspects of the Free Trade Agreement), and Mexico will be analyzed.

**223. Estate Planning** (2) II. Dobris

Seminar—2 hours. Prerequisite: course 221. Selected topic(s) in the estates and trusts area. Class presentation and research paper will satisfy the legal writing requirement. Limited enrollment.

**224. Consumer Transaction (3) II.** Loiseaux

Discussion—3 hours. Study of selected consumer law problems, including a survey of state and federal regulatory efforts. Course coverage may include the following: common law and statutory approaches to fraudulent or deceptive practices, disclosure of information, consumer credit regulation, equal credit opportunity legislation, quality standards, enforcement by the creditor, consumer remedies, and attorney fees for representing consumers.

**225. Marital Property (3) I.** Dailey; II. Bruch

Discussion—3 hours. The California community property system including rights of spouses and treatment of property during marriage; characterization, valuation, and division of property upon termination of marriage by dissolution, nullity, or death; and premarital contractual agreements. Also covered are nonmarital cohabitation, creditor's rights, and spousal support.

**\*226. Mass Media Law (2)**

Discussion—2 hours. Course will survey legal issues associated with the mass media. Topics covered will include legal problems of news media and news gathering, the regulation of broadcasting, free press/fair trial, and cable television, and the effect of the new technologies.

**227. Criminal Procedure (3) I.** Parnas; II. Feeney

Discussion—3 hours. The police function: arrest, search and seizure, electronic surveillance, entrapment, police interrogation and confessions, lineups, the exclusionary rule, the role of counsel.

**\*228. Business Planning (3) II.**

Discussion—3 hours. Prerequisite: courses 220, and either courses 213 and 214 or course 215. Consideration of selected problems in business planning.

**\*229. Agricultural Law Seminar (2)**

Seminar—2 hours. Study of selected current issues in agricultural regulation and trade. Instructor and students will select issue areas for study. Class presentation and paper required.

**\*230. Family Law (Short Course) (2) I.**

Discussion—2 hours. Survey of history, current law, and policy regarding marriage, divorce, and their consequences. Extent of governmental intrusion into individual and family privacy is the overriding policy issue. Role of the family lawyer is the key practical issue. Among subjects covered are constitutional framework, non-marital cohabitation, marriage regulation, spouse abuse, juvenile court overview, divorce, support, custody, and adoption confidentiality. (Conflict of laws and marital property not included.)

**\*231. Legislative Process (3) II.**

Discussion—3 hours. Course covers fundamental elements of the legislative process, including legislative procedure; the legislature as an institution; the legislative investigative power; lobbying; legislative-executive relations; and the legislature's constitutional powers and limitations.

**232. Real Estate Finance (3)**

Discussion—3 hours. 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. Course strongly oriented toward current California law, and toward practical application of legal doctrines.

**\*233. International Human Rights (2)**

Seminar—2 hours. Selected topics pertaining to the protection of individuals under treaties and norms of customary international law. Specifically, the seminar will explore problems such as the extent to which national courts are required to uphold such rights; how the U.N. can create human rights norms; the investigation of violations of human rights law; remedies and international enforcement mechanisms; the use of force for human rights purposes; and the substantive requirements of specific human rights norms such as those concerning war crimes, genocide, apartheid, terrorism, and torture. Seminar paper will satisfy the advanced legal writing requirement.

**234. Family Law Practice (3) II.** Lannon, Fitzmaurice

Seminar—2 hours: clinical—1 hour. Prerequisite:

course 225; course 230 or 272 (concurrently) recommended. Combined seminar and clinic to provide marital-legal counseling under the direct supervision of the instructor. Clinical participation required twice during semester. Students also participate in weekly 2-hour seminar which will cover a wide range of topic areas pertaining to family law practice. Limited enrollment. (S/U grading only.)

**235. Administrative Law (2) I.** Gandara

Discussion—2 hours. Prerequisite: course 217. Control of the administrative operations of government will be studied. Federal regulation of business enterprise and of the provision of social services and subsidies provide the principal examples of subjects to be treated. Various statutory delegations of power to administrative agencies and attempts by the judiciary, executive and legislative branches to control these delegated powers will be studied in some depth. The protection of individual rights, such as those of employees and recipients of governmental benefits, in the complex administrative state, and the regulation of particular industries, will also receive attention.

**236. Securities Regulation (2) II.** Hillman

Discussion—2 hours. Prerequisite: courses 213 and 214, or course 215. The primary purpose of this course is to familiarize students with laws and regulations, federal and state, relating to the issuance of and trading in corporate securities. It includes materials pertaining to the scope of the term "securities," the registration of securities, intrastate and private offerings, and civil liability under the Securities Act of 1933 and the Securities Exchange Act of 1934.

**\*237. Commercial Paper (3)**

Discussion—3 hours. Course in the law of commercial payment systems covering Articles 3 and 4 of the Uniform Commercial Code. Coverage includes the concepts of negotiability, the liability of parties, and the rights of holders of checks and notes. The law of bank deposits and collections and the legal relationship between banks and their customers will be explored. Recent developments in the law of credit cards and electronic fund transfer systems will also be addressed.

**238. Basic Federal Income Taxation of Business Enterprise (4) I.** Simmons

Discussion—4 hours. Prerequisite: course 220. The owners of partnerships and subchapter S corporations (pass-through entities) are taxed on items of income, deduction, and loss, as if the owner incurred the item directly. Corporations and shareholders are subject to income tax at both the entity and shareholder levels. This course examines the identity, organization, operation, and dissolution of pass-through entities in terms of the income tax impact of these transactions. Also examined are the formation, capitalization, operation, and liquidation of regular corporations subject to the double tax regime of subchapter C of the Internal Revenue Code.

**\*239. Sentencing Seminar (2) II.** Parnas

Seminar—2 hours. Consideration of sentencing goals, procedure, present alternatives, and suggested changes. Guests. Class presentation and required seminar paper.

**240. Law of Elections and Political Campaigns (2) I.** Feeney

Discussion—2 hours. Course covers constitutional, statutory, administrative and case law aspects of federal and state elections, including laws relating to primaries, general elections, initiatives, recalls, filing requirements, financial disclosures, and conflicts of interest.

**\*241. Legal Accounting (2)**

Discussion—2 hours. Introduction to accounting for non-accountants. The goal is to provide background and skill that students may put to work in other law school courses and in practice. Basic concepts will be stressed to assure that accounting fundamentals are understood and that their relation to legal problems may be demonstrated. Students with substantial prior accounting experience (more than six credit hours) may not enroll in this course.

**242. Conflict of Laws (Long Course) (4) II.** Juenger

Discussion—4 hours. Study of transactions with multistate or international contacts. The topics covered include jurisdiction, recognition of foreign judgments, and choice of applicable law. The course deals with problems practitioners frequently encounter in a wide variety of fields, such as commercial law, family law and personal injury law.

**243. Debtor-Creditor (3) II.** Ayer

Discussion—3 hours. Survey of the rights and obligations of debtors in trouble, and of their creditors. Most of it concerns proceedings under the Bankruptcy Code. In the first part of the course, an examination of how and why debtors are permitted to get a "fresh start," wiping out their obligations. Later, consideration of how the bankruptcy trustee collects and distributes money to pay creditors' claims. Study of the bankruptcy system as it applies to both individuals and corporations.

**244. Basic Human Physiology (2) II.** Gray

Lecture—2 hours. Overall view of the anatomy and physiology of the human body, giving the law student a basic understanding of the normal structure and functioning of the various organ systems. Medical terminology is stressed and students have an opportunity to analyze the medical aspects of several medical-legal cases. (S/U grading only.)

**245. Estate and Gift Taxation (3)**

Discussion—3 hours. Prerequisite: course 220. Study of the federal taxation of gifts, trusts, and estates.

**246. Federal Jurisdiction (3) II.** Oakley

Discussion—3 hours. Study of the subject matter jurisdiction of federal courts. Statutory provisions for the federal district courts to adjudicate civil actions arising under federal law or between parties of diverse citizenship will be examined in contemporary detail, and from the perspective of history and the Constitution. Federal appellate jurisdiction, federal writs in the nature of habeas corpus, and miscellaneous matters affecting attorneys' decisions to seek a federal forum will also be discussed. In addition to careful study of the fine points of relevant legislation in light of their history, the course will examine and develop the constitutional doctrines of separation of powers and federalism as guides to understanding the Supreme Court's leading opinions on the scope of federal jurisdiction.

**247. Advanced Federal Income Taxation of Business Enterprise (3) II.** Simmons

Discussion—3 hours. Prerequisite: course 220 and 238. Continuation of course 238. Focuses on the federal income tax considerations involved in the transfer of business assets including corporate liquidation as an asset acquisition technique, corporate reorganizations, divisive reorganizations, and the transfer of corporate attributes in a reorganization transaction. Also examines tax planning for affiliated groups of corporations.

**248. International Law (3) I.** Glennon

Discussion—3 hours. Prerequisite: course 217 recommended. This introductory course covers basic international law concepts such as statehood and recognition; treaty law and customary international law; use of force; human rights and war crimes; expropriation; the relationships between international law and national law; and the jurisprudence of international law.

**\*249. Comparative Law (2)**

Discussion—2 hours. Comparison of methods and sources of common and civil law; background and structure of the principal civil codes; analysis and study of problems arising in international transactions.

**250. Jurisprudence (2) I.** Oakley

Seminar—2 hours. Course considers the relationships between justice and law with special attention to the problem of how judges should decide hard cases where the content of the law is in doubt. To what extent should a judge's personal convictions about justice affect decisions about the legal rights of the parties to a law suit? Does it matter if the judge is interpreting precedent rather than legislation?

Introductory readings of a general and synthetic nature will be followed by a sampling of philosophical essays analyzing particular problems of adjudication. Grading will be based on active class participation and on an original paper which meets the standards of the advanced legal writing requirement. Limited enrollment.

**251. Labor Law** (3) I. West

Discussion—3 hours. Study of federal law, primarily statutory, relating to: (1) employee organization and the establishment of the collective bargaining relationship; (2) the negotiation of the collective bargaining agreement; and (3) the exertion of primary and secondary economic pressure. Federal law will be compared with state wrongful discharge law.

**252. Gender-Based Discrimination** (3)

Discussion—3 hours. Course focuses on legal issues raised by legal and social discrimination between men and women. It explores potential remedies drawn from constitutional law, statutory enactments, and common law developments. Subject matter areas include sex-based discrimination in family law, educational opportunity, and criminal law.

**253. Products Liability** (3) I. Hogan

Discussion—3 hours. Civil action for harm to the consumer resulting from dangerous and defective products.

**254. Seminar in Legal History** (2) I. Rabin

Seminar—2 hours. Most students have only a haphazard exposure to the persons, events, and concepts that have shaped American law. Thus American lawyers do not share a common cultural heritage that would facilitate communication and shared values. In this seminar, each student would choose, in consultation with the instructor, a particular person, event, or concept to be the subject of his or her paper. Possible topics might include: a biography, together with representative opinions or briefs, of an outstanding lawyer or jurist; the historical background and effect of a key judicial decision or statute; the importance and effect of a particular development in legal education or legal theory. Each student will be required to prepare and present a paper that would fulfill the legal writing requirement. Each paper, together with its supporting documents, would be used as the nucleus of teaching materials that might be published for use in courses in legal history. Limited enrollment.

**255. Pension Law** (3) II. Wolk

Discussion—3 hours. Federal regulation and taxation of private pensions and other forms of deferred compensation and tax-favored retirement savings. The course will focus on the Employee Retirement Security Act of 1974 (ERISA) and will deal with such topics as coverage, vesting, integration with social security, funding, spousal interests (both during marriage and after divorce), retiree health and welfare plans, and preemption of state law. Fiduciary problems will also be examined, particularly in the area of corporate takeovers and plan investments. Problems surrounding plan terminations will also be considered, including bankruptcy issues. Pension Benefit Guarantee Corporation insurance, and the issue of asset reversions to employers in the case of overfunded plans.

**256. Land Use Planning** (3) II. Kirkland

Discussion—3 hours. Legislative, judicial, and administrative methods used to facilitate the rational use of land. Legal topics considered within this context will include zoning, subdivision regulation, nuisance, eminent domain, general plans, and environmental controls affecting land use.

**\*257. Foreign Relations Law** (3) I.

Discussion—3 hours. Prerequisite: course 217 or consent of instructor. Seminar covers subjects such as the war power, the treaty power and executive agreements, arms sales and military assistance, the recognition power, the negotiation power, the scope of the appropriations power as a check on executive activities, and other separation-of-powers issues generated by the intersection of international law and

constitutional law. Class presentation and required seminar paper will satisfy the advanced legal writing requirement. Limited enrollment.

**258A. Professional Responsibility** (1) I. Wydick, Schwartz; II. Perschbacher

Discussion—1 hour. Study of ethical duties and responsibilities under the American Bar Association Code of Professional Responsibility, the Model Rules of Professional Conduct, and the Code of Judicial Conduct. Required of all students for graduation. (S/U grading only.)

**258B. Professional Responsibility** (2) I, II. Perschbacher

Discussion—2 hours. Prerequisite: course 258A. Continuation of course 258A. Discussion in greater depth of problems and issues of professional responsibility. Also covered will be issues of professional versus personal responsibility and choices for students' professional lives. Students who sign up to take the course for two units will take a multiple choice examination as a midterm and will continue on in the course for the rest of the semester.

**259. Disability Rights Law** (2) I. Wolinsky

Discussion—2 hours. Survey of legal issues involving the rights of disabled persons. (S/U grading only.)

**260. Employment Discrimination** (3) II. West

Discussion—3 hours. Consideration of employment discrimination based upon race, color, religion, sex, national origin, age, and sexual orientation. Course will focus on Title VII of the Civil Rights Act of 1964, and include coverage of Art. 1981, Art. 1983, the Equal Pay and Age Discrimination Acts. State fair employment laws will also be discussed.

**\*261. Local Government** (2)

Discussion—2 hours. Examines selected topics of current interest to California cities and counties. The last time this course was given the topics included: (a) California Tort Claims Act, (b) Administrative Procedure Act, (c) antitrust liability of local governments, (d) eminent domain law, and (e) section 1983 (civil rights actions) against local governments. Course is particularly useful for persons who may work for city attorneys or county counselors.

**262. Antitrust** (3) II. Wydick

Discussion—3 hours. Study of the federal antitrust laws including price fixing, limits on distribution, tying arrangements, monopolization, and mergers.

**263A. Trial Practice I** (3) I, II. Imwinkelried

Discussion—2 hours; laboratory—2 hours. Prerequisite: course 219. Introduction to the preparation and trial of cases, featuring lectures, videotapes, demonstrations, assigned readings and forensic drills. Laboratory will be held on Tuesday, Wednesday, or Thursday evening. (S/U grading only.) Limited enrollment.

**263B. Trial Practice II** (2) II.

Discussion—2 hours. Prerequisite: course 263A. Advanced trial practice and litigation skills course featuring student preparation of and participation in mock trials with occasional class sessions. (S/U grading only.) Limited enrollment.

**264. Water Law** (3) I. Dunning

Discussion—3 hours. Property rights in surface waters, including riparianism, prior appropriation and federal reserved rights; water administration institutions, including the federal reclamation program; the law of interstate waters and property rights in ground water. Emphasis is placed upon California water law and policy.

**\*265. Natural Resource Law** (2) I.

Seminar—2 hours. Prerequisite: consent of instructor or course 264, 285, or 287. Examination of public rights to the use of natural resources. Each student will select one topic for development within the seminar and will be expected to prepare a substantial research paper on that topic which would satisfy the advanced legal writing requirement. Limited enrollment.

**\*266. Wildlife Protection Law** (2) II.

Seminar—2 hours. Course will encompass federal and state laws directed at wildlife protection, as well as international norms. Required paper will satisfy the advanced legal writing requirement.

**267. Civil Rights Law** (2) I. Bernhard

Discussion—2 hours. Surveys racial patterns in American law. May include the following: history of racial discrimination in public facilities, voting, the administration of criminal justice, public schools, housing, and employment. In addition, considers the remedies for racial discrimination, including actions under: 42 U.S.C.A.s 1981, 1982, 1983 and 1985; the Civil Rights Act of 1964; Title VI (programs receiving federal aid); Title VII (employment); the Voting Rights Act of 1965.

**268. Seminar in Jewish Law** (2) I. Rabin

Discussion—2 hours. The term 'Jewish Law' refers to those subjects that would normally be taught in an American law school as they have been approached by the Jewish legal system. This system is based primarily on the Talmud and on the commentaries and decisions that are derived from it. Jewish law is of interest to American law students not for its immediate practical value, but because it is a foreign legal system that is one of the oldest in the world, and one that has faced many of the problems now facing American law. Specifically, although Jewish law is purportedly based on immutable religious law, changing conditions over the centuries have encouraged methods of adaptation that are reminiscent of American constitutional law. Each student will be required to prepare and present a paper that would fulfill the advanced legal writing requirement. Neither a knowledge of foreign language nor a previous exposure to Jewish law is necessary. Limited enrollment.

**269. Corporate Finance** (3) II. Ayer

Discussion—3 hours. Focuses on how businesses raise money. Consists of two parts: a study of elementary "finance theory" and consideration of how this theory is applied by courts and legislatures.

**\*270. International Business Transactions** (2)

Discussion—2 hours. Consideration of selected problems in international business transactions.

**\*271. Labor Law Seminar** (2) II.

Seminar—2 hours. Study of current questions from a critical legal studies perspective, including cases pending before the Supreme Court, law reform, impasse resolution in the public and private sectors, union authority and individual rights, the rights of the unorganized, the assumptions and myths of American labor law, labor relations of multinational corporations, and comparative industrial democracy ("paternalism"), work councils, codetermination, and self-management). Satisfies advanced legal writing requirement. Limited enrollment.

**272. Family Law (Long Course)** (3) I. Bruch

Discussion—3 hours. Designed for the student with a substantial interest in Family Law. Emphasizes the legal, social, and emotional aspects of parent-child relationships, including decisions concerning medical care, neglect, dependency, abuse, foster care, termination of parental rights, adoption, artificial insemination, surrogacy, paternity, legitimacy, surnames, birth control, abortion, child support and child custody. How attorneys, mental health professions and the judicial process do and should deal with these issues (e.g., interviewing, counseling, and mediation) are also considered.

**273. Current Issues in Family and Marital Property** (2) II. Bruch

Seminar—2 hours. Prerequisite: course 225, course 230 or 272, or consent of instructor. Examination in depth of important current issues in the fields of family and marital property law. Heavy emphasis on law reform, including study and direct observation of the legislative process. Each student will select one issue for development and presentation in the seminar. A research paper or draft bill and supporting analysis is required. A more lengthy paper with additional unit credit may be arranged with consent of instructor to satisfy the legal writing requirement.

**274. Intellectual Property** (3) I. Kurtz

Discussion—3 hours. Study of the protection of intellectual property and unfair competition. Among the topics considered are trade secrets, patents, trade

marks, misleading and false advertising, and copy-rights.

**275. Business Litigation (2) II. The Staff**

Discussion—2 hours. Focuses on issues that frequently arise in large, commercial litigation. The class will read and discuss materials, including case studies, raising issues of advanced civil procedure, including but not limited to the complexities of litigating class actions, the attorney-client privilege and work product doctrine, discovery and "discovery abuse," and the settlement of multi-defendant cases. Although many of these issues are touched on in the first-year civil procedure course, we will delve into them in greater detail and discuss some of the issues currently being litigated. The class will also discuss personal moral dilemmas that attorneys may face in representing corporate clients, such as the decisions attorneys in large law firms must make when assigned a case, or are asked by a client to take action, which, although legal, they believe to be morally objectionable.

**276. The Juvenile Justice Process (2) I. Parnas**

Discussion—2 hours. Legal and philosophical basis of a separate juvenile justice process; police investigation, apprehension, and diversion; probation intake and detention; juvenile court hearing and disposition; juvenile corrections. Major emphasis is on the emerging role of counsel at each phase of the process. Guest speakers and field trips.

**\*277. American Indian Law (2)**

Discussion—2 hours. Study of the distinctive legal doctrines relating to Indians, Indian tribes, and Indian reservations. Major focus will be on the governmental powers of federal, state, and tribal governments over Indians and over non-Indians residing on or doing business on Indian reservations. The law on Indian lands, waters, and fishing and hunting rights will also be emphasized.

**278. Pretrial Skills (3) II. Johns**

Discussion—3 hours. Course uses a series of role-playing exercises and class discussions to introduce students to a set of non-trial skills basic to the practice of law. The course concentrates on client interviewing and counseling, but will also include exercises in witness interviewing, negotiation, drafting of pleadings, discovery plans, and discovery documents. It is an expanded version of the client counseling course. Limited enrollment.

**\*279. Public Sector Labor Law (2)**

Seminar—2 hours. Prerequisite: course 251 or consent of instructor. Application of private sector labor law doctrines to the public sector. Emphasis is on the four California public sector statutes and the impact of constitutional law on public employees. Class presentation and seminar paper will satisfy advanced legal writing requirement. Limited enrollment.

**280. Advanced Legal Writing Seminar (2) I. Wydick**

Seminar—2 hours. How to write a variety of legal documents in plain English. Writing exercises and outside readings will be assigned weekly. Each student will complete an individual writing project in lieu of final examination. The writing project will satisfy the law school's advanced legal writing requirements. Limited enrollment. (S/U grading only.)

**\*281. Children and the Law (2)**

Discussion—2 hours. Prerequisite: course 230 or 272 or consent of instructor. Course will consider the child in relationship to the family and society. Attention will be given to such topics as paternity and legitimacy; custody, foster care, and adoption; juvenile court proceedings; rights to support, health, birth control and education; legal capacity and emancipation.

**282. Energy Law (2)**

Discussion—2 hours. Prerequisite: course 235. Introduction to regulation of the energy sector. Topics to be covered include regulation of natural monopolies, regulation of electricity and natural gas, legal aspects of the development of conventional and alternative energy sources, and international dimensions of energy development and regulation.

**283. Remedies (3) I. Love; II. Hogan**

Discussion—3 hours. Study of common law reme-

dies: damages, specific performance, injunctions, and restitutionary relief. Focus of course will be on the efficiency, fairness, and practicality of the alternative remedies available to the practitioner and the court.

**\*284. Advanced Criminal Procedure (3) II.**

Discussion—3 hours. Essential to those who wish to handle criminal cases. In particular, it treats bail, prosecutorial discretion, plea bargaining, trial by jury, and sentencing. (Course 227 need not be taken before this course.)

**285. Environmental Law (3) I. Dunning**

Discussion—3 hours. Introduction to the law dealing with environmental impact, particularly the National Environmental Policy Act, and to pollution control law. Particular emphasis is given to the Clean Water Act and various statutes on toxics in the environment. An introduction to the Clean Air Act is also provided.

**\*286. Law and Economics (2) I.**

Discussion—2 hours. Course will examine a number of legal issues using economic analysis. Possible topics include the economic consequences of liability rules, economic analysis of contract law, theory of the firm and basic economics of corporate law and antitrust, the theory that the common law is efficient, and economic interpretations of basic concepts of Anglo-American law such as rights, property, harm, and equality. Prior background in economics is welcome but not necessary.

**287. Public Land Law (2) I. Dunning**

Discussion—2 hours. Legal aspects of federal land management, including the history of public land law, authority over federal lands and specialized law dealing with particular natural resources and uses found on federal lands (mining, timber, range, wildlife, recreation and preservation).

**\*288. Advanced Constitutional Law Seminar (2) II.**

Seminar—2 hours; paper. Explores in-depth selected topics or problems in constitutional law and theory. Topics may include public choice theory, the public-private distinction, community-based theories of constitutional order, theories of judicial review, theories of the First Amendment, the nature of constitutional law, rhetoric, etc. Problem areas may include separation of powers, freedom of speech, substantive due process, equal protection, affirmative action, and constitutional litigation. Satisfies advanced legal writing requirement. Limited enrollment.

**289. Toxics Law (2) II. Dunning**

Discussion—2 hours. Government efforts to regulate the release of toxic chemicals to the environment and to clean up existing toxic dump sites. "Toxic torts"—personal injury actions related to toxics in the environment—are included.

**290. Criminal Justice Administration Seminar (2) I. Parnas**

Seminar—2 hours. Consideration of current reform efforts in criminal justice administration. Emphasis will be on the pre-trial process. Specified topics will include bail reform and pre-trial detention, criminal discovery, and the charging process. Class presentation and required seminar paper will satisfy the advanced legal writing requirement.

**\*291. Mexican-American Legal Relations (3) I.**

Discussion—3 hours; final examination or research paper on approval by instructor. Course will include a description and juridical analysis of the differences and similarities of the legal and political systems of the two countries; a survey of the legal aspects of doing business in Mexico; foreign investment; Mexico's external debt; trade (including imports and exports, oil, the GATT, technology transfer and intellectual property); selected bilateral and multilateral treaties, executive agreements and regional international law. Satisfies advanced legal writing requirement.

**292. Immigration Law and Procedure (3) I. Smith**

Seminar—3 hours. Course will survey a brief history of U.S. immigration and policy and compare the policies of other countries; use of primary and secondary sources of immigration law; federal agency interrelationship (Justice and State Department);

entry of nonimmigrant (temporary) visitors and immigrants into the United States; the world-wide quota and preference systems; family and employment relationship critical to securing favored immigrant status; deportation procedures; discretionary relief available to persons otherwise subject to deportation; available defenses to deportation and exclusion proceedings; refugee and asylum law; administrative appeals; federal and state judicial relief; citizenship and naturalization. Students may also participate in mock deportation and asylum hearings.

**293. Public Interest Law Seminar (2) I. Johnson**

Seminar—2 hours. Examines various aspects of public interest litigation and practice. Includes a survey of legal techniques and problems common to public interest practice.

**294. Problems in Fiduciary Administration (2) II. Dobris**

Seminar—2 hours. Prerequisite: course 221. Selected topics in the area of fiduciary administration of estates and trusts. Required class presentation and research paper will satisfy the advanced legal writing requirement. Limited enrollment.

**\*295. Advanced Civil Procedure (2)**

Discussion—2 hours. Treatment in-depth of topics introduced in the basic civil procedure course and characteristic of modern multiparty, multiclaim litigation. Areas studied include joinder of parties in complex federal court litigation, class actions, discovery, judicial management of litigation, multidistrict litigation in federal courts, and preclusion (*res judicata* and *collateral estoppel*). Not all topics will be covered in any one semester.

**296. Copyright and Entertainment Law (3) II. Kurtz**

Discussion—3 hours. First half of course will involve a detailed consideration of the law of copyright, with emphasis on its application to motion pictures, music, television, and theatre. Second half of course will involve a study of other legal problems in the entertainment industry, including misappropriation, protection of titles and characters, and the rights of privacy and publicity.

**297. Client Interviewing and Counseling (2) I, II. Smith**

Discussion—2 hours. Course uses a series of role-playing exercises and class discussions to introduce students to a set of non-trial skills basic to the practice of law. Course concentrates on client interviewing and counseling but also includes exercises in witness interviewing, negotiation, and drafting of pleadings. Limited enrollment. (S/U grading only.)

**298. Group Study (1-4) I, II. The Staff**

Groups of students (not fewer than 4 or more than 10) with common interest in studying a stated legal problem may plan and conduct their own research and seminar program, subject to the following regulations: (1) the program may extend over no more than two semesters; (2) the plan for the program and the list of members of the group must be submitted to Dean's Office at least 4 weeks prior to opening of the semester in which the program is to begin; (3) the three-member faculty board will be appointed for each group proposed and will have authority to approve or disapprove the program and the amount of credit sought; (4) changes in the program or in membership of the group must be approved by the faculty board and normally will be approved only prior to the semester involved; (5) group members must conduct a weekly seminar session to be arranged by them; (6) each member of the group must submit an individual paper or an approved alternative growing out of the seminar subject to the faculty board; (7) S/U grading basis only unless the entire group requests letter grades in advance.

**299. Research in Legal Problems (1-4) I, II. The Staff**

Students may receive credit for individual research 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 (normally, no faculty member will be permitted to supervise more than five students working on individual programs during any

semester); (3) an outline of the project must be approved by the supervising faculty member in advance of the semester in which it is to be undertaken; (4) student must submit an individual paper or approved alternative to the supervising faculty member. (S/U grading only.)

### Professional Courses

#### 410A. Appellate Advocacy (Moot Court) (1) I. Perschbacher

Program includes classroom instruction in appellate procedure and appellate advocacy skills and participation in the moot court program. Participants in 410A work on three oral advocacy problems and argue six times before a moot court. Both courses, 410A and 410B, must be taken in order to qualify for interschool competitions. Limited enrollment. (S/U grading only.)

#### 410B. Appellate Advocacy (Moot Court) (1) II. Perschbacher

Prerequisite: course 410A. Continuation of course 410A. Participants in 410B research and write an appellate brief and argue the case twice before a moot court. Both courses, 410A and 410B, must be taken in order to qualify for interschool competitions. Limited enrollment. (S/U grading only.)

#### 413. Interschool Competition (1-3) I, II. The Staff

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) I, II. The Staff

Prerequisite: course 410A-410B. 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. Limited enrollment. (S/U grading only.)

#### 415. Trial Practice Honors Board (1) II. Imwinkelried

Members of the Trial Practice Honors Board administer the Trial Practice II course. Students may receive one credit for service on the Board. Credit is awarded upon approval of faculty adviser. (S/U grading only.)

#### 416. Law Review Writer (1-2) I and/or II.

Writing of an editorship quality law review article under the editorial supervision of editors of the *Law Review*. Minimum of 40 hours contribution to the *Review's* publication is also required. Credit may be obtained only upon achieving status as a member of the *Law Review*, which requires that the student have made substantial progress toward completing an editorship article. Credit is awarded only after certification by the Editor-in-Chief of the *Law Review* and approval of the faculty advisers to the *Law Review*. One unit of credit is earned the first semester. Two units are earned the second semester upon completing an editorship draft. One unit is earned second semester if only a membership draft is completed. (S/U grading only.)

#### 417. Law Review Editor (2) I, II. The Staff

Editors must have completed an editorship article and must perform editorial duties requiring a substantial time commitment. Credit is awarded only after certification by the Editor-in-Chief of the *Law Review* and approval of the faculty advisers to the *Law Review*. Editors of the *Law Review* may receive two units for each semester of service as an editor, up to a maximum of four units. (S/U grading only.)

#### 418. Enviros Editor (1) I, II. The Staff

The Editor-In-Chief of *Enviros* may receive one credit for each semester of service. Credit must be

approved by the faculty adviser to *Enviros*. Only one person may receive this credit in any one semester. (S/U grading only.)

#### 419. Advanced Writing Project(1-4) I, II. The Staff

Completion of a writing project under the active and regular supervision of a faculty member in satisfaction of the legal writing requirement. Writing project must be an individually authored work of rigorous intellectual effort of at least 20 typewritten, double-spaced pages, excluding footnotes. 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). Advanced writing project may also be undertaken in connection with another course or seminar to satisfy the legal writing requirement. Number of units for the writing project shall be approved by the faculty supervisor and will depend upon the scope of the writing effort. (Grading may be on S/U or letter-grade basis at the faculty supervisor's discretion.)

#### 420. Individual Clinicals (2-12) I, II. The Staff

Individual Clinical Program—4 hours (1 unit) to full time (12 units). Prerequisite: to be arranged with practicing attorneys and public agency of student's choice with approval of Clinical Committee and under sponsorship of faculty member; relevant substantive and procedural courses recommended. Clinical must be under appropriate legal supervision and designed to maximize educational benefits. Students arranging individual clinicals in subject matter areas covered by Formal Clinical Programs (e.g., criminal justice, employment relations, legislative, immigration) must enroll in the Formal Clinical Program and attend the required seminars (see courses 234, 440, 455, 470). With exception of a clinical semester away, students may enroll in no more than 6 units in any one semester or any one clinical placement. With a full time clinical semester away, one course may be taken in conjunction with course 420 with consent of Dean (14 semester units maximum total). For complete description of policies and procedure governing the design, approval, requirements and limitations of individual clinical, see "Clinical Guidelines" obtainable from Dean's Office or clinical office. (S/U grading only.) (Completed application and confirming letter from clinical placement must be submitted to Clinical Office one month prior to beginning of semester in which credit is requested.)

#### 425. Judicial Clinicals (2-12) I, II. The Staff

Clinical Program—to be arranged. Prerequisite: relevant substantive and procedural courses recommended. Students may arrange individual judicial clerkship clinical programs with state and federal judges of their choice with the approval of the Clinical Committee and under the sponsorship of individual faculty members. An introductory orientation seminar is required. Otherwise, the requirements for the program are the same as for Individual Clinicals (course 420). (S/U grading only.)

#### 440. Clinical Program in Immigration Law (2-12) I, II. Smith

Discussion—2-12 hours Client clinic course will include a seminar on immigration law practice, individual weekly case conferences with faculty supervisor and assigned immigration law cases. Students may represent clients in administrative law hearings in San Francisco. Minimum units for the course are 4 and maximum is 12. Each unit assumes four hours work per week, including participation in the seminar, conference, and case research and development. Students who have completed course 292 may take the clinic for a minimum of 2 units. Limited enrollment. (S/U grading only.)

#### 450. Clinical Program in Environmental Law (2-6) I, II. Dunning

Clinical Program. Practical experience in environmental law. Students will work under the direct supervision of a government or private lawyer engaged in some form of environmental law work for a minimum of 8 office hours per week. (For purpose of this course, "environmental law" includes land use control by public means.) Students will also be

required to prepare a bi-weekly journal, noting, commenting upon, and reflecting upon their clinical experience, and to participate in occasional meetings of students enrolled in program. (S/U grading only.)

#### 455. Clinical Program in Employment Relations (2-12) I, II. West

Clinical Program. Prerequisite: prior or concurrent enrollment in course 251 or 260 or consent of instructor. Practical experience in employment relations: private and public sector labor law, or employment discrimination. Students will work under the direct supervision of a government or private lawyer and will have the opportunity to participate in a range of activities associated with their specific office, with emphasis on observation and participation in actual investigation, interviewing, drafting of pleadings, and attendance at hearings. Weekly journals and attendance at monthly small group meetings required. (S/U grading only.)

#### 465. Clinical Program in Administrative Law (2-6) I, II. Gandara

Clinic—2-6 hours. Prerequisite: course 235 (may be taken concurrently) or consent of instructor. For students interested in a work experience in an administrative law setting. Students will work under the direct supervision of an administrative law judge, hearing officer, or government attorney. Placement assistance will be provided by the instructor. A goal of this clinical will be a breadth of experience in the areas of formal adjudication, informal adjudication, rule-making, and judicial review. Students will be required to meet monthly as a group to share experiences and maintain observational journals. (S/U grading only.)

#### 470. Clinical Program in the Administration of Criminal Justice (2-12) I, II. Feeney

Clinical program. Prerequisite: courses 219, 227 and 263A recommended. This program affords students the opportunity to gain practical experience working full- or part-time in a District Attorney's or Public Defender's office in one of several surrounding counties for a minimum of 13 office hours per week. Students enrolled in the program engage in the full range of activities associated with their specific office with emphasis on observation and participation in factual investigation, interviewing, counseling, negotiating, motion practice, and trials under State Bar rules. Journals and seminar attendance are required. Limited enrollment. May be repeated for a total of 12 units. (S/U grading only.)

#### 495. Instruction in Legal Research and Writing Skills (1-2) I. Bernhard; II. Bernhard, Johns

Participants will assist in instructing legal research and writing for first-year students under the direction of the legal research and writing instructors. Approval of the research and writing instructors is required for enrollment. Participants may assist once in the legal research program and once in the legal writing program. One unit will be given in the fall semester for legal research instruction and two units in the spring for legal writing instruction. (S/U grading only.)

## Linguistics

(College of Letters and Science)

Robert VanValin, Jr., Ph.D., Program Director

Program Office, 922 Sproul Hall (916-752-9933)

### Committee in Charge

Wilbur A. Benware, Ph.D. (*German*)

Caroline Henton, D.Phil. (*Linguistics*)

Maria I. Manea-Manoliu, Ph.D. (*French*)

Almerindo E. Ojeda, Ph.D. (*Spanish*)

Lenora A. Timm, Ph.D. (*Linguistics*)

Robert VanValin, Jr., Ph.D. (*Linguistics*)

David P. Wilkins, Ph.D. (*Linguistics*)

Aram Yengoyan, Ph.D. (*Anthropology*)

**Faculty**

Wilbur A. Benware, Ph.D., Associate Professor  
(*German*)  
Nina F. Dronkers, Ph.D., Assistant Adjunct Professor  
Linnea C. Ehri, Ph.D., Professor (*Education*)  
James Gallant, Ph.D., Associate Professor (*Russian*)  
Caroline Henton, D.Phil., Assistant Professor  
Jeri J. Jaeger, Ph.D., Lecturer  
Maria I. Manea-Manoliu, Ph.D., Professor (*French*)  
Barbara J. Merino, Ph.D., Associate Professor  
(*Education*)  
Michael T. Motley, Ph.D., Professor (*Rhetoric and Communication*)  
Almerindo E. Ojeda, Ph.D., Assistant Professor  
(*Spanish*)  
David L. Olmsted, Ph.D., Professor (*Anthropology*)  
Winfried Schleiner, Ph.D., Professor (*English*)  
Gwendolyn Schwabe, M.A., Senior Lecturer  
(*English*)  
Janet S. Shibamoto, Ph.D., Associate Professor  
(*Anthropology*)  
Lenora A. Timm, Ph.D., Associate Professor  
Máximo Torreblanca, Ph.D., Professor (*Spanish*)  
Robert VanValin, Jr., Ph.D., Associate Professor  
Carolyn F. Wall, Ph.D., Lecturer (*Anthropology*)  
Benjamin E. Wallacker, Ph.D., Professor (*Chinese and Japanese*)  
Michael V. Wedin, Ph.D., Professor (*Philosophy*)  
David P. Wilkins, Ph.D., Assistant Professor  
Aram Yengoyan, Ph.D., Professor (*Anthropology*)

**The Major Program**

The discipline of linguistics encompasses a broad spectrum of knowledge about human language. Linguistics focuses on theories of language, description of contemporary languages, and the study of language change through time. It also has important applications within many other disciplines such as anthropology, biology, communications, education, language teaching, literature, philosophy, psychology, and sociology.

The major is designed to familiarize students with linguistic theory and the methods of linguistic analysis at gradually accelerated levels of methodological and theoretical complexity through a sequence of "core" courses. Elective courses allow the student to explore areas which overlap linguistics'.

**A.B. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter</b> ..... Linguistics 1 ..... Foreign language, 20 units of Greek or Latin; or 22 units of any other language; or 30 units of two different languages	24-34
<b>Depth Subject Matter</b> ..... Linguistics 102, 109, 120, 139, 140, 165 ..... Anthropology 110 ..... Linguistics 100, 170, or Anthropology 220 (see College procedures governing undergraduate enrollment in a graduate course) .....	44
At least 12 upper division units from the following courses: ..... Anthropology 111, 112, 114, 117, 120, Education 117, 118, 151, English 105A, 105B, 107, French 159, 160, 161, German 105, 106, Human Development 101, any other linguistics course not included in the 24-unit requirement above, Philosophy 137, Psychology 132, Rhetoric 105, 107, Russian 160, Spanish 131, 132, 133	12
<i>The student should note that a number of these courses have prerequisites. Since it is usual to select some emphasis within the Linguistics major (e.g., anthropology, a foreign language, etc.) such prerequisites should be completed as a matter of course.</i>	
<b>Total Units for the Major</b> .....	68-78

**Major Adviser.** W.A. Benware.

**Minor Program Requirements:**

The minor in Linguistics is designed to provide the student with a basic knowledge of linguistic analysis. It would be appropriate for students interested in any aspect of language use.

**UNITS**

<b>Linguistics</b> .....	<b>24</b>
Linguistics 1, 109, 139, and 140 .....	16
Additional units of upper division Linguistics courses, chosen in consultation with an adviser.....	8

**Minor Adviser.** Same as Major adviser.

**Graduate Study.** The Linguistics Graduate Group offers study and research leading to the M.A. degree. Detailed information may be obtained from the Graduate Adviser or from the Chairperson of the Linguistics Group.

**Graduate Adviser.** A. E. Ojeda.

**Courses in Linguistics****Lower Division Course**

<b>1. Introduction to Linguistics</b> (4) I, II, III. Henton, Benware, Wilkins
Lecture—3 hours; discussion—1 hour. Introduction to the study of language; its nature, diversity, and structure. General Education credit: Civilization and Culture/Introductory.

<b>10. Elementary American Sign Language</b> (5) I. The Staff
Recitation—4 hours; discussion—1 hour. Prerequisite: course 1 recommended. Introduction to American Sign Language grammar and vocabulary, with emphasis on conversational skills.

<b>11. Elementary American Sign Language</b> (5) II. The Staff
Recitation—4 hours; discussion—1 hour. Prerequisite: course 10. Continuation of course 10.

<b>12. Elementary American Sign Language</b> (5) III. The Staff
Recitation—4 hours; discussion—1 hour. Prerequisite: course 11. Continuation of course 11.

**Upper Division Courses**

<b>*100. Languages of East Asia</b> (4) II. Wallacker
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Survey of languages and language families of East Asia; their natures and distributions.

<b>102. Historical Linguistics</b> (4) II. Wilkins
Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 109. Description and methods of the historical study of language; sound change, morphological change, syntactic change, semantic change.

<b>109. Phonetics</b> (4) I. Henton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to articulatory phonetics with some attention to the fundamentals of acoustic phonetics.

<b>113. Language, Gender and Society</b> (4) III. Timm, Henton
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Investigation of real and putative (stereotyped) sex-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. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Linguistics 1 or Anthropology 4.

<b>115. Chicano Sociolinguistics</b> (3) II. Timm
Lecture—3 hours. Prerequisite: course 1 and Spanish 3 or the equivalent. Study of the varieties of Chicano Spanish spoken in the Southwest. Patterns of Spanish-English bilingualism; attitudes about Spanish and English; Chicano Spanish and the schools. Offered in odd-numbered years.

<b>120. Semantics</b> (4) I. Wilkins
Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Introduction to the study of meaning: the nature of the linguistic sign,

the structure of the lexicon, and the semantics of sentences.

**135. Introduction to Psycholinguistics** (4) II. Jaeger

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; courses 139, 140 recommended. Introduction to psychological issues relating to language and to the implications of research in psychology for linguistic theory.

**138. Language Development** (4) III. Jaeger

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or consent of the instructor. Theory and research on children's acquisition of their native language including the sound system, grammatical structure, basic semantic categories, and social aspects of usage.

**139. Phonological Analysis** (4) II. Henton

Lecture—3 hours; discussion—1 hour. Prerequisite: course 109. Introduction to and application of phonological theory. ..

**140. Grammatical Analysis** (4) I. VanValin, Wilkins

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Introduction to syntactic analysis; survey of types of syntactic and semantic phenomena in natural languages. Emphasis will be on developing skills and data analysis, rather than on investigating formal aspects of the theoretical framework to be employed.

**\*150. Contrastive Analysis of Spanish and English** (4) III. Timm

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and Spanish 3 or the equivalent. Comparison of the linguistic structures (phonology, morphology, and syntax) of Spanish and English; learning problems of both native Spanish and native English speakers will be considered. Offered in even-numbered years.

**165. Introduction to Syntactic Theory** (4) II. Van Valin

Lecture—3 hours; discussion—1 hour. Prerequisite: course 140. Introduction to syntactic theory, primarily through the detailed study of a major theory of syntax, emphasizing theoretical reasoning, argumentation and theory building

**169. Current Theories of Syntax** (4) III. Ojeda, Van Valin

Lecture—3 hours; discussion—1 hour. Prerequisite: course 165. Examination of major contemporary theories of syntax.

**170. Language Universals and Typology** (4) III. VanValin, Wilkins

Lecture—3 hours; term paper. Prerequisite: course 165 (may be taken concurrently). 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 a non-Indo-European language and comparison with English.

**172. Language Structures** (4) III. The Staff

Lecture—3 hours; term paper. Prerequisite: courses 102, 139, 140. In-depth study of the structure of a particular language or members of a language family or area. May be repeated for credit.

**175. Biological Basis of Language** (4) III. Dronkers

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.

**192. Internship in Linguistics** (1-12) I, II, III. The Staff (Timm in charge)

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) I, II, III. The Staff (Director in charge)

Individual 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. (P/NP grading only.)

**197T. Tutoring in Linguistics (1-4) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: upper division standing with Linguistics major 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) II, III. The Staff (Chairperson in charge)**

Prerequisite: senior standing in Linguistics. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (VanValin in charge)**

(P/NP grading only.)

**Graduate Courses**

**202. Principles of Historical Linguistics (4) III.**

Manea-Manoliu, Wilkins

Lecture—3 hours; term paper. Prerequisite: course 102. Advanced treatment of the theory and methods of historical linguistics. Offered in even-numbered years.

**209. Advanced Phonetics (4) II. Henton**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 109. Exploration of the physiological basis of speech articulation and an introduction to acoustic phonetics. Offered in odd-numbered years.

**210. Advanced Semantic Theory and Analysis (4) II. Wilkins**

Lecture—3 hours; term paper. Prerequisite: course 120, 140. Advanced critical exploration of contemporary theories of linguistic semantics. Offered in odd-numbered years.

**\*215. Computational Linguistics (4) I. The Staff**

Lecture—3 hours; term paper. Prerequisite: course 165 or consent of instructor; course 120 recommended. Applications of computers and the computational paradigm to the analysis and description of the syntax and semantics of language. Models of human performance in the use of language. Offered in odd-numbered years.

**220. Romance Linguistics (4) II. Manea-Manoliu**

Seminar—3 hours; term paper. Prerequisite: one course from the following: courses 102, 139, 140. The development of the major Romance languages from Proto-Romance to the modern era. Selected topics in the structure of modern Romance languages. Option of focus on phonology, syntax, or historical linguistics.

**\*225A. Modern Linguistic Theory: Structuralism (4) II. VanValin**

Lecture—3 hours; term paper. Prerequisite: courses 139, 140. Survey of the development of structural linguistics from deSaussure to the 1950s. Offered in even-numbered years.

**\*225B. Modern Linguistic Theory: Generative**

**Grammar (4) III. VanValin, Ojeda**

Lecture—3 hours; term paper. Prerequisite: courses 139, 165. Survey of the development of generative grammar and its offshoots from the 1950s to the present. Offered in even-numbered years.

**239. Advanced Phonological Theory and Analysis (4) III. Henton**

Lecture—3 hours; term paper. Prerequisite: course 139. Critical overview of current phonological theories. Offered in odd-numbered years.

**250A-250B-250C-250D. Topics in Linguistic Theory and Methods (4-4-4) I, II, III. The Staff**

Seminar—3 hours; paper. Prerequisite: graduate standing and consent of instructor. Introduction to current research in various aspects of linguistics.

**265. Advanced Syntactic Theory and Analysis (4) III. Van Valin**

Lecture—3 hours; term paper. Prerequisite: course 165. Critical survey of contemporary theories of syntax, with concentration on functionalist theories. Offered in odd-numbered years.

**280. Theory of English as a Second Language (4) I. The Staff**

Lecture—3 hours; term paper. Theoretical issues that have influenced the teaching of English as a second language. Contributions of collateral disciplines—psycholinguistics, sociolinguistics, and cognitive psychology—to English as a second language instruction.

**281. Research on Second Language Acquisition (4) II. Merino**

Lecture—2 hours; laboratory—1 hour; term paper; computer projects. Prerequisite: upper division or graduate standing. Analysis of theory/research on L2 acquisition. Topics include: contrast of L1/L2 acquisition; current theories of L2 such as the natural order and input hypotheses, as well as effects of individual variation, cognition, motivation on L2; research design and basic statistical analyses.

**282. Individual and Social Aspects of Bilingualism (4) III. Timm**

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.

**297. English as a Second Language**

**Teaching/Tutoring (4) III. Schwabe**

Clinic—4 hours. Prerequisite: course 300, English 302 and 303 (may be taken concurrently). Teaching classes for ESL graduate students in the UC Davis ESL Clinic in pronunciation, listening, reading, writing, etc.; aiding the ESL undergraduate composition classes; tutoring foreign graduate student TAs in pronunciation; observing and critiquing off-campus ESL classes. Does not fulfill requirement toward the M.A. May be repeated for credit. (S/U grading only.)

**298. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: graduate standing. (S/U grading only.)

**299. Research (1-12) I, II, III. The Staff (VanValin in charge)**

(S/U grading only.)

**Professional Course**

**300. The Teaching of English as a Foreign Language (4) I. Schwabe**

Lecture—3 hours; laboratory—3 hours. Prerequisite: English 105A or course 109 or consent of instructor. Methods of teaching English to nonnative speakers, stressing particularly recent linguistic methodology and techniques.

guage teaching). The program is structured so as to place considerable emphasis on interdisciplinary studies, thereby increasing the breadth of the candidate's knowledge, and providing a wider and more flexible variety of options to pursue thereafter.

**Preparation.** Applicants to the M.A. program who do not have a bachelor's degree in Linguistics must complete the following courses in Linguistics from the undergraduate program: 109 (phonetics), 102 (historical linguistics), 120 (semantics), 139 (phonological analysis), 140 (grammatical analysis), and 165 (introduction to syntactic theory).

**Requirements.** The requirements for the two tracks differ. The track in applied linguistics and TESOL operates under the Plan II program. Thirty-six units of upper division and graduate course work above and beyond the prerequisite courses listed under Preparation (above) are required, and at the end of the course work a student must pass a written comprehensive examination. The track in general linguistics falls under the Plan I set of requirements. Thirty units of upper division and graduate course work above and beyond the prerequisite courses must be completed, and a thesis is required. Students in both tracks must pass a foreign language reading examination.

**Graduate Adviser.** A. E. Ojeda (*Spanish*).

## Literature in Translation

The following courses are open to students throughout the campus. The readings can be in English. Refer to departmental listing for the course description.

### Chinese

- 10. Modern Chinese Literature
- \*11. Great Books of China
- 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
- 109A-I. Topics in Chinese Literature (in English)

### Classics

- 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 Civilization: From Myth to Faith
- 2. Great Books of Western Civilization: From Faith to Reason
- 3. Great Books of Western Civilization: The Modern Crisis
- \*4. The Short Story and Novella
- 5. Fairy Tales, Fables and Parables
- 6. Myths and Legends
- 7. Literature of Fantasy and the Supernatural
- 8. Utopias and their Transformations
- 10A-N. Master Authors of World Literature
- 12. Introduction to Women Writers
- \*13. Dramatic Literature
- \*15. The Spiritual Quest
- 20. Man and the Natural World
- 25. Ethnic Minority Writers in World Literature
- \*53A. Literature of China and Japan
- \*53B. Literature of India and Southeast Asia
- 135. Women Writers
- 140. Thematic and structural Study of Literature
- 141. Literary Theory and Criticism
- \*145. Representations of the City
- 146. Myth in Literature

- 153. The Forms of Asian Literature
- 157. War and Peace in Literature
- \*159A-G. Special Topics in Comparative 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
- 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

## Dramatic Art

- 20. Introduction to Dramatic Art
- 156. Theatre and Drama: Aeschylus to Machiavelli
- 157. Theatre and Drama: Shakespeare to Schiller
- 158. Theatre and Drama: Ibsen to Albee
- 159. Contemporary Experimental Theatre and Drama

## English

- 171A. The Bible as Literature: The Old Testament
- \*171B. The Bible as Literature: Prophets and New Testament.

## French

- 25. Introduction to French Literature
- 12. Masterpieces of French Drama
- 113. Masterpieces of French Novel
- 14. French Philosophical Literature
- \*150. Masterpieces of French Literature

## German

- 48. Myth and Saga in the Germanic Cultures
- 50. Survey of German Culture
- 51. Introduction to Literary Analysis
- \*52. Masterworks of German Literature
- \*110. Older German Literature
- \*111. Studies of Major Writers from the Seventeenth to the Twentieth Century
- 112. Special Topics in German Literature
- 113. Goethe's *Faust*
- \*114. The Faust Tradition before and after Goethe
- 115A. German Literature since 1945
- \*115B. German Literature since 1945
- \*116. From Goethe's *Werther* to Today's *Werthers*
- 117A. The Tristan Tradition: Medieval, Musical, Modern
- \*117B. The Nibelungen Tradition: Medieval, Musical, and Modern
- \*118A. Fin-de-siècle Vienna (The Swan Song of the Habsburg Empire)
- \*118B. Weimar Culture: Defeat, the Roaring Twenties, the Rise of Nazism
- \*140. German Political Literature from the Middle Ages to the Present

## Italian

- 25. Italian Literature in Translation
- \*139A. Early Italian Literature and Dante Alighieri
- 139B. Boccaccio, Petrarch and the Renaissance
- \*139C. Modern Italian Literature

## Japanese

- 10. Masterworks of Japanese Literature (in English)
- 15. Introduction to Traditional Japanese Culture
- 101. Japanese Literature in Translation: The Early Period
- 102. Japanese Literature in Translation: The
- 103. Middle Period
- 104. Japanese Literature in Translation: The Modern Period
- 105. Modern Japanese Literature: War and Revolution
- 105. Modern Japanese Literature: Hero and Anti-Hero
- 105. Japanese Culture through Films
- 108. Poetry of China and Japan

- 103. Japanese Literature in Translation: The Modern Period
- 104. Modern Japanese Literature: War and Revolution
- 105. Modern Japanese Literature: Hero and Anti-Hero
- 105. Japanese Culture through Films
- 108. Poetry of China and Japan

## 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 literature and poetry)
- 188. Special Topics in Native American Literary Studies

## Russian

- \*30. Great Russian Writers
- 41. Survey of Nineteenth-Century Russian Literature
- 42. Survey of Twentieth-Century Russian Literature
- 44. Children's Literature in Russia
- \*121. Nineteenth-Century Russian Prose
- 123. Twentieth-Century Russian Prose
- \*126. The Russian Theater
- 130. Contemporary Soviet Culture
- 131. Literature of Revolution
- 132. Nature and Culture in the Soviet Union
- 140. Dostoevsky
- 141. Tolstoy
- \*150. Russian Culture
- 151. Soviet Writers and Censorship
- 154. Russian Folklore
- 166. Representations of Sexuality in Russian Literature

## Scandinavian

- 110. Masterworks of Scandinavian Literature in Translation
- 111. Swedish Film as Narrative

## Spanish

- 34. Mexico in Its Literature
- 35. Survey of Mexican Culture
- 149. Latin-American Literature in Translation
- 150. Masterpieces of Spanish Literature

# Management, School of

Robert H. Smiley, Ph.D., Dean  
School Office, 308 Voorhies Hall (916-752-7362)

## Faculty

- Jack Barbash, Ph.D., Visiting Professor
- Nicole W. Biggart, Ph.D., Associate Professor (*Management, Sociology*)
- George Bittingmayer, Ph.D., Associate Professor
- David S. Bunch, Ph.D., Assistant Professor
- Richard P. Castanias, Ph.D., Associate Professor
- Peter Clark, Ph.D., Professor
- Richard C. Dorf, Ph.D., Professor (*Management, Electrical and Computer Engineering*)
- George Frankel, J.D., Lecturer (*Management, Law*)
- Paul A. Griffin, Ph.D., Professor
- Michael Hagerty, Ph.D., Associate Professor
- Michael Maher, Ph.D., Professor
- Alexander F. McCalla, Ph.D., Professor (*Agricultural Economics*)
- David M. Rocke, Ph.D., Professor
- Arthur M. Sullivan, Ph.D., Associate Professor (*Management, Economics*)
- Jerome J. Suran, B.S., Ph.D. (hon.), Senior Lecturer (*Management, Electrical and Computer*)

*Engineering)*  
Donald M. Topkis, Ph.D., Associate Professor  
Gary M. Walton, Ph.D., Professor (*Management, Economics*)

## Courses in Management

### Lower Division Course

#### 100. Introduction to Financial Accounting (3)

Griffin

Lecture—3 hours. Prerequisite: no prior knowledge of accounting is required. 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. Preparation of financial statements, including balance sheet and statements of income and cash flow, as well as their analysis by investors and managers.

### Graduate Courses

(Core Courses)

#### 201A. Financial Accounting and Reporting (3)

Griffin

Lecture—3 hours. Introduction to the basic principles of accounting, financial reporting and policy, with special attention to the preparation, analysis, and evaluation of published corporate financial statements. Topics include income measurement and valuation, assets and liabilities, owner's equity and intercorporate investments.

#### 201B. Management Accounting and Control (3)

Maher

Lecture—3 hours. Prerequisite: course 201A. Provides an introduction to the preparation, analysis, and evaluation of data provided by cost accounting for management planning and control, budgeting, performance evaluation, and investment decision making.

#### 202. Organizational Behavior (3) Biggart

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Introduction to analysis of social process within organizations. Topics include group dynamics, informal relations, leadership theories, socialization processes, power and conflict, goal setting, decision making, and organizational culture. Consideration of alternative theoretical models.

#### 203. Organization Theory (3) The Staff

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; course 202. Analysis of structural properties of organizations including differentiation, integration, and alternative structural configurations. Examination of technological and sociotechnical constraints on organizations; Organization-environment relations; organizational change.

#### 204. Economic Analysis I (3) Sullivan

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; introductory knowledge of microeconomics. Economic reasoning applied to resource-allocation decisions of consumers, firms, and governmental bodies. Market forces and the price system. Corporate strategy and industrial organization.

#### 205. Economic Analysis II (3) Sullivan

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; course 204. Continuation of course 204. Analysis of forces behind the supply of capital and labor. Examination of market efficiency, externalities, market failure, and public-policy responses to market failure.

#### 206. Evaluation of Policies and Programs (3) The Staff

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Quantitative procedures for assessing the efficiency, effectiveness of policies and programs. Methodologies employed include experimental, quasi-experimental design, time series analysis. The advantages and limitations of various kinds of evaluation methods through case studies.

#### 207. Financial Theory and Policy (3) The Staff

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; courses 204, 205. Intertemporal allocations of scarce resources by individuals,

firms, and society when alternatives are risky. Factors which affect the valuation of risky short, long-run real, and financial assets. Financial policy, financial planning for profit-seeking, and not-for-profit organizations.

#### **208. Marketing Management (3) Hagerty**

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Marketing management process, analysis of market opportunities, elements of market research, development of marketing strategies, market planning, implementation, and control systems. Consumer and industrial markets, market segmentation, pricing strategies, distribution channels, promotion, sales.

#### **209. Computers and Information Systems (3) The Staff**

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Introduces student to computer, develops programming and data handling skills. Studies use of computer in organizations, emphasis on managerial aspects of computing. Topics include standard and nonstandard uses of data files, centralization versus decentralization of computing, office automation, computer security.

#### **210A. Statistics for Management (3) The Staff**

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; course 209. Introduction to statistics for managerial decision making. Descriptive statistics, sampling, statistical inference, hypothesis testing.

#### **210B. Statistics for Management (3) The Staff**

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; courses 209 and 210A. Regression analysis and time series. Stresses applications of the techniques to problems in public and private administration.

#### **211. Quantitative Analysis for Decision Making (3) Bunch**

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; courses 210A-210B. Quantitative decision making. Decision analysis and mathematical modeling of complex decision processes. Linear programming, optimization, and simulation. Stresses applications of decision analysis in public and private administration.

#### *(Second-Year Courses)*

Students must complete the Management core course requirement before enrolling in any of the following courses, or petition with consent of the instructor.

#### **215. Law and Legal Process (3) The Staff**

Lecture—3 hours. 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.

#### **220. Public Budgeting and Finance (3) The Staff**

Lecture—3 hours. Fiscal role of government in a mixed economy and democratic society; economics and politics of taxation and resource allocation; intergovernmental financial relations; budgeting activities of local governments.

#### **224. Human Resources Management (3) Biggart**

Lecture—3 hours. Problems of recruiting, training, motivating, compensating, and separating workers in contemporary organizations. Topics include design of incentive systems, career management, professionalization, alienation, worker burnout, organizational deviance, and current issues such as affirmative action and the unionization of public employees.

#### **225. Labor Relations (3) Barbash**

Lecture—3 hours. Course deals with labor organization, employment relationships, employer-employee negotiations, contracts, and litigation. Worker and management rights, and collective bargaining in the public and private sectors will be explored.

#### **228. Statistical Quality Control and Productivity Improvement (3) Rocke**

Lecture—3 hours. Prerequisite: courses 210A and 210B or the equivalent. Introduces concepts of quality and productivity improvement as applied to service and production industries and the public sector.

Methods covered include statistical quality control techniques such as control charts and acceptance sampling, reliability, and graphical tools.

#### **229. Regulation and Public Policy (3) The Staff**

Lecture—3 hours. Identification and application of techniques of policy analysis to public sector issues and activities: emphasis on regulation and government interventions in the private sector.

#### **\*231. Intergovernmental Systems and Administration (3) The Staff**

Lecture—3 hours. Intergovernmental dimensions of public management, particularly how policies of higher levels of government shape the actions at other levels of government. Attention given to grants and contracts, regulations, fiscal devices, technical assistance, and to various substantive policy areas.

#### **232. Urban Policy and Planning (3) The Staff**

Lecture—3 hours. Analysis of public policy in an urban setting, focusing on the efficiency effects of such policies. Topics include urban spatial structure, growth-management policies, housing, transportation, environmental quality, local government finance, and urban planning.

#### **233. Regulation and Policy in Agriculture (3) The Staff**

Lecture—3 hours. Implications for management of regulation and public policy on agricultural production choices, practices, processing, and marketing; influences on management strategy, organization, business practices, and resource productivity; trends in regulation and policy and their potential for management strategies are explored.

#### **\*234. Urban Economics and Real Estate (3) The Staff**

Lecture—3 hours. Applies economic reasoning to managerial decisions concerning the siting of firms and public agencies. Examines institutional setting and alternative strategies for real-estate finance and development. Examines impact of public policy on location decisions of firms.

#### **240. Management Policy (3) Suran**

Lecture—3 hours. Integrative examination of managing the total organizational enterprise. Missions, objectives, strategies, policies, measurements and controls; case studies.

#### **241. Managerial Decision Making (3) Bunch**

Lecture—3 hours. Develops analytical skills for evaluating decisions and solving problems in various managerial settings. Emphasis is on problem structuring, decision analysis, and implementation. Course examines individual decision strategies, group processes, and organizational decision making.

#### **242. Competitive Analysis (3) Bunch**

Lecture—3 hours. Applies quantitative and behavioral analysis to decision problems involving competition. Problem areas include competitive analysis of pricing, bidding, and bargaining situations. Course considers aspects of negotiations in labor relations, arbitration, mergers, and regulation.

#### **\*243. Risk Management (3) The Staff**

Lecture—3 hours. Analyzes managerial problems in which uncertainty and risk are crucial elements in decision making. Problem areas include societal risks, insurance, financial investments, hedging, and new ventures. Course develops a unified framework for analyzing risk in various contexts.

#### **244. New and Small Business Ventures (3) Dorf**

Lecture—3 hours. Emphasizes starting a new business venture or managing a small, ongoing business during its formative stages. The business plan. Legal forms, financial considerations, the management team. The entrepreneur. Students develop a detailed business plan.

#### **248. Marketing Strategies (3) Hagerty**

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.

#### **249. Marketing Research (3) Hagerty**

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.

#### **250. Technology Management (3) Dorf**

Lecture—3 hours. 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.

#### **251. Management of Innovation (3) Suran**

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.

#### **252. Production and Operations Management (3) The Staff**

Lecture—3 hours. Explores methods of increasing operational efficiency in production and service organizations through planning and scheduling, materials management, inventory control, quality control, and distribution. Methodologies employed include such techniques as programming, simulation, systems analysis, queueing, and network models.

#### **260. Financial Management (3) Castanias**

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.

#### **261. Investment Analysis (3) Johnson**

Lecture—3 hours. Examines modern asset pricing theory and the implications of that theory for the analysis and management of stocks, bonds, and other financial securities. Factors influencing the value of stocks, bonds, options, warrants, and other securities are discussed from the perspective of a portfolio fund manager.

#### **262. Money and Security Markets (3) The Staff**

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 in specific markets.

#### **263. Options and Futures Markets (3) Johnson**

Lecture—3 hours. Studies the behavior of options and futures markets; how public agencies, businesses, others use those markets. Studies nature of various strategies involving options, commodity, financial futures contracts. Price determination in options and futures markets is also examined.

#### **264. Business Taxation (3) The Staff**

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.

#### **265. Theory of Financial Decision Making (3) Castanias**

Lecture—3 hours. Prerequisite: course 207 or the equivalent. Theory of financial decision making.

#### **266. International Finance (3) Castanias**

Lecture—3 hours. Prerequisite: course 207 or the equivalent. Open economy macroeconomics, balance of payments theory, and financial decision making in multinational firms.

#### **270. Corporate Financial Reporting (3) Griffin**

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 policy makers.

**271. Accounting and Budgeting for Management Control** (3) The Staff

Lecture—3 hours. Examines concepts and techniques of accounting and budgeting for management decision making in the private sector. Topics include cost control, capital budgeting, performance evaluation, and the effects of uncertainty in achieving management objectives.

**272. Evaluation of Financial Information** (3) Griffin

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.

**273. Accounting and Reporting for Governmental and Nonprofit Entities** (3) The Staff

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.

**274. Auditing, Internal Control, and Public Accounting** (3) The Staff

Lecture—3 hours. Concentrates on role of the independent public accountant as auditor and consultant, from the perspective of an enterprise manager. Auditing standards, auditing procedures, and auditing control techniques are discussed. Emphasis is also given to current issues confronting the accounting profession.

**280. Data and File Management** (3) Topkis

Lecture—3 hours. Concepts of information storage and retrieval on digital computers. Emphasis on file structures and their uses within organizations; applications drawn from both the public and private sector.

**281. Systems Analysis and Design** (3) The Staff

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.

**282. Discrete System Simulation** (3) The Staff

Lecture—3 hours. Prerequisite: course 280. Computer simulation of discrete dynamical systems under uncertainty. Topics include model building, computer implementation, output interpretation, and sensitivity analysis. Applications to managerial decision problems stressed.

**\*283. Optimization Theory and Applications** (3)

Topkis  
Lecture—3 hours. Introduces applied optimization theory. Examines linear, nonlinear, discrete, and dynamic programming; optimality conditions; transportation, networks, and large-scale systems; and computer implementation. Applications are made to problems in private and public management.

**284. Applied Linear Models for Management** (3)

The Staff  
Lecture—3 hours. Covers regression, analysis of variance, and multivariate analysis. Topics will focus on applications to management and policy problems.

**285. Time Series Analysis and Forecasting** (3)

Wecker  
Lecture—3 hours. 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.

**286. Telecommunications and Computer Networks** (3) Topkis

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.

**287. Database Systems** (3) The Staff

Lecture—3 hours. Prerequisite: course 280. Hierarchical, network, and relational models for database systems. Design and implementation of models. Performance evaluation and benchmarking. Query structures and languages. Data security and integrity. Application to managerial decision making and decision support systems.

**288. Special Topics in Management of Information Systems** (3) Topkis

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.

**\*289. Computer Concepts and Software Systems**

(3) The Staff

Lecture—3 hours. Prerequisite: course 280. Fundamental concepts of computer operation including computer architecture, machine language and assembly language, operating systems, and the operating environment for applications programs. Emphasis on microcomputer systems with managerial applications.

**290. Seminar in Management** (3)

Seminar—3 hours. Interdisciplinary case study of a real business or government enterprise.

**298. Directed Group Study** (1-5) The Staff

Prerequisite: consent of instructor.

**299. Individual Study** (1-12) The Staff

Prerequisite: consent of instructor. (S/U grading only.)

## Mathematics

(College of Letters and Science)

Arthur J. Krener, Ph.D., Chairperson of the Department

Dallas O. Banks, Ph.D., Vice-Chairperson of the Department (Graduate Matters)

Sherman K. Stein, Ph.D., Vice-Chairperson of the Department (Undergraduate Matters)  
Department Office, 565 Kerr Hall (916-752-0827)

**Faculty**

Henry L. Alder, Ph.D., Professor

Hubert A. Arnold, Ph.D., Professor Emeritus

George A. Baker, Ph.D., Professor Emeritus

Dallas O. Banks, Ph.D., Professor

<sup>4</sup>David W. Barnette, Ph.D., Professor

Donald C. Benson, Ph.D., Professor Emeritus

Carlos R. Borges, Ph.D., Professor

Robert J. Buck, Ph.D., Associate Professor

Albert C. Burdette, Ph.D., Professor Emeritus

Gulbank D. Chakerian, Ph.D., Professor

<sup>2</sup>Angela Y. Cheer, Ph.D., Associate Professor

Doyle O. Cutler, Ph.D., Professor

James R. Diederich, Ph.D., Professor

Allan L. Edelson, Ph.D., Professor

Curtis M. Fulton, Ph.D., Professor Emeritus

Robert D. Glauz, Ph.D., Professor

<sup>1</sup>Joel Hass, Ph.D., Assistant Professor

Charles A. Hayes, Jr., Ph.D., Professor Emeritus

<sup>1</sup>Frederick A. Howes, Ph.D., Professor

John K. Hunter, Ph.D., Professor

Kurt Kreith, Ph.D., Professor

Arthur J. Krener, Ph.D., Professor

<sup>2,3</sup>Melven R. Krom, Ph.D., Professor

Gary J. Kurowski, Ph.D., Professor

David G. Mead, Ph.D., Professor

E. O. Milton, Ph.D., Professor

Motohiko Mulase, Ph.D., Visiting Associate Professor

Donald A. Norton, Ph.D., Professor Emeritus

Nikolaos S. Papageorgiou, Ph.D., Assistant Professor

Washelt F. Pfeffer, Ph.D., Professor

E. Gerry Puckett, Ph.D., Assistant Professor

Edward B. Roessler, Ph.D., Professor Emeritus

<sup>3,4</sup>G. Thomas Sallee, Ph.D., Professor

Evelyn M. Silvia, Ph.D., Professor

Sherman K. Stein, Litt.D. (hon.), Ph.D., Professor

Robert W. Stringall, Ph.D., Professor Emeritus

Takayuki Tamura, D.Sc., Professor Emeritus

<sup>2</sup>J. Blake Temple, Ph.D., Associate Professor

<sup>1</sup>Abigail Thompson, Ph.D., Assistant Professor

<sup>3,4</sup>Craig A. Tracy, Ph.D., Professor

Edward J. Tully, Jr., Ph.D., Associate Professor

Howard J. Weiner, Ph.D., Professor

Roger J.B. Wets, Ph.D., Professor

**The Major Programs**

Students majoring in mathematics may follow a program leading to either the Bachelor of Arts or the Bachelor of Science degree. The latter is especially recommended for students who intend to pursue mathematics at the graduate level. Under either degree program the student may prepare for various careers by an appropriate choice of elective courses.

Developing an ability to think and communicate in mathematical terms is the basic objective of both bachelor degree programs. This ability requires familiarity with the concepts and techniques of various branches of mathematics and is necessary for graduate study in mathematics as well as the successful pursuit of mathematically oriented careers. In particular, mathematics is an essential tool for people working in the physical sciences, and mathematics is now being widely applied to studies in the biological and social sciences as well. Students with career oriented programs in applied mathematics should supplement their mathematics curriculum with courses in other departments which provide background in their proposed area of application. Mathematics provides an excellent background for entry into the Schools of Administration, Law,

Medicine, or Veterinary Medicine and for graduate study in many other areas. Mathematics is also fine preparation for employment immediately after graduation, since the completion of a mathematics major is taken by many employers as evidence that an applicant can think and learn, two attributes highly prized in an employee. Also, as more and more fields become quantified and scientific, a strong background in mathematics will be required of persons to make meaningful contributions and to reach the top.

## A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b>	<b>36-39</b>
Mathematics 11 (or high school equivalent) .....	0-3
Mathematics 21A, 21B, 21C, 22A, 22B .....	18
Mathematics 22C or 36 .....	3
Computer Science Engineering 30 .....	3
Physics 8A .....	4
Additional non-Mathematics courses chosen from natural sciences .....	8
<b>Core Requirements</b>	<b>36</b>
Mathematics 108 .....	4
Mathematics 127A, 127B .....	8
Mathematics 150A, 150B .....	8
Choose one Track from the following two .....	16
<b>Track 1: Secondary Teaching</b>	
Mathematics 115A .....	3
Mathematics 141 .....	3
Additional upper division units .....	10
Recommended: Mathematics 115B, 115C, 116, 167, 168; Mathematics 131 and Statistics 131B or Statistics 131A-131B or Statistics 130A-130B; Computer Science Engineering 110, 122	
<b>Track 2: General Mathematics</b>	
Additional upper division units .....	16
<b>Total Units for the Major</b>	<b>72-75</b>

## B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b>	<b>28-39</b>
Mathematics 11 (or high school equivalent) .....	0-3
Mathematics 21A, 21B, 21C, 22A, 22B .....	18
Computer Science Engineering 30 .....	3
Mathematics 22C (Tracks 1 and 2 only) .....	3
Mathematics 22C or 36 (Tracks 3 and 4 only) .....	3
Physics 9A, 9B, 9C (Tracks 1 and 2 only) .....	12
Physics 9A (Track 3 only) .....	4
Statistics 13 or 102 (Track 4 only) .....	4
<b>Core Requirements</b>	<b>45</b>
Mathematics 108 .....	4
Mathematics 127A, 127B .....	8
Mathematics 150A, 150B .....	8
Choose one Track from the following four .....	25
<b>Track 1: Preparation for Graduate Study in Mathematics</b>	
Mathematics 127C .....	4
Mathematics 150C .....	4
One course from Mathematics 125, 126, 147 .....	3
Additional upper division units .....	14
Recommended: Mathematics 118A, 118B, 119, 125, 126, 141, 147, 185A, 185B	
<b>Track 2: Applied Mathematics</b>	
Mathematics 167 .....	3
Two courses from Mathematics 128A, 128B, 128C .....	8
Additional upper division units .....	14
Recommended: Mathematics 118A, 118B, 118C, 119, 145, 168, 185A, 185B, Statistics 131 or Mathematics 131A, Computer Science Engineering 110, 122, up to 8 units of courses outside of mathematics department related to area of interest	

### Track 3: Mathematics for Secondary Teaching

Mathematics 115A .....	3
Mathematics 141 .....	3
Additional upper division units .....	19
Recommended: Mathematics 115B, 115C, 167, 168, Statistics 130A, 130B, or 131 and Statistics 131B or Statistics 131A, 131B, Computer Science Engineering 110, 122	

### Track 4: General Mathematics

Additional upper division units .....	25
<b>Total Units for the Major</b>	<b>73-84</b>

### 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.

### Depth Subject Matter Requirements

Certain mathematically-oriented courses given by other departments may be admissible in partial satisfaction of the above mentioned 36- or 45-unit requirements with prior departmental approval. In general, 192, 197TC, 198, and 199 courses are not appropriate for application towards this requirement; and any exceptions must be approved by the Department's Undergraduate Program Committee.

**Statement of Objectives.** As early as possible, but no later than the last quarter of the sophomore year, each prospective mathematics major should choose, in consultation with an adviser, one of the tracks as suggested by the adviser, prepare a statement of his or her mathematics objectives, and have a proposed program satisfying the requirements of the chosen track. The form to be used for this statement is available from the Department, and must be submitted in time to receive final approval prior to the last day of instruction of the first quarter of the junior year. Prospective mathematics majors transferring to the University at the upper division level should consult an adviser immediately upon arrival.

**Major Advisers.** H. L. Alder, R. J. Buck, J. R. Diederich, R. D. Glauz, F. A. Howes, M. R. Krom, G. J. Kurowski, D. G. Mead, E.O. Milton, E. M. Silvia, S. K. Stein, E.J. Tully.

**Information for Undergraduates.** Assistance in planning an undergraduate major program in mathematics should be obtained from a major adviser. In addition, students seeking information pertaining to the application of mathematics to the biological or social sciences or computer science may contact the appropriate special area adviser.

Students desiring preparation towards an A.B. degree for secondary teaching or general mathematics, or a B.S. degree for graduate study, biological sciences, physical sciences, secondary teaching, or general mathematics should consult an undergraduate adviser.

**Prerequisite Credit.** No student may repeat a course, if that course is a prerequisite for a course which has already been completed with a grade of C- or better.

### Minor Program Requirements:

	UNITS
<b>Mathematics</b>	<b>20</b>
Upper division units in mathematics (exclusive of Mathematics 192, 197TC, 198, 199) .....	20

Three of these units could be from

Mathematics 36.

**Teaching Credential Subject Representative.** G. T. Sallee. See also under Teacher Education Program.

**Graduate Study.** The Department offers programs of study and research leading to the M.A., M.A.T., and Ph.D. degrees in mathematics. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Mathematics.

**Graduate Advisers.** G.D. Chakerian, D.O. Cutler, G.T. Sallee (M.A.T. degree), W.F. Pfeffer.

## Courses in Mathematics

### Lower Division Courses

**B. Elementary Algebra** (no credit) I. The Staff Lecture—3 hours. Basic concepts of algebra, including polynomials, factoring, equations, graphs, and inequalities. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P/NP grading only.) (There is a fee of \$45.)

**C. Trigonometry** (no credit) I, II. The Staff

Lecture—2 hours. Basic concepts of trigonometry, including trigonometric functions, identities, inverse functions, and applications. Offered only if sufficient number of students enroll. Not open to Concurrent student enrollment. (P/NP grading only.) (There is a fee of \$30.)

**D. Intermediate Algebra** (no credit) I, II. The Staff

Lecture—3 hours. Basic concepts of algebra, designed to prepare the student 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. Not open to Concurrent student enrollment. (P/NP grading only.) (There is a fee of \$15.)

**11. Analytic Geometry** (3) I, II, III. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: two years high school algebra, plane geometry, plane trigonometry; and obtaining required score on Precalculus Qualifying Examination. Analytic geometry in two dimensions; elementary functions. (Not open to students who have completed courses 16A-16B-16C or 21A-21B-21C.)

(Note: Mathematics 16A, 16B, and 16C are intended for students who will take no more Mathematics courses.)

**16A. Short Calculus** (3) I, II, III. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: one and one-half years of high school algebra, plane geometry, plane trigonometry, and obtaining required score on Precalculus Qualifying Examination. Limits; differentiation of algebraic functions; analytic geometry; applications, in particular to maxima and minima problems. Not open to students who have received credit for course 21A.

**16B. Short Calculus** (3) I, II, III. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: course 16A or 21A. Integration; calculus for trigonometric, exponential, and logarithmic functions; applications. Not open to students who have received credit for course 21B.

**16C. Short Calculus** (3) I, II, III. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: course 16B or 21B. Differential equations; partial derivatives; double integrals; applications; series. Not open to students who have received credit for course 21C.

**21A. Calculus** (4) I, II, III. The Staff

Lecture-discussion—4 hours. Prerequisite: two years of high school algebra, plane geometry, plane trigonometry, and analytic geometry or course 11, and obtaining required score on Precalculus Qualifying Examination. 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. Only two units of credit will be allowed to students who have credit for course 16A. (Not open to students who have completed course 16B.) (CAN Math 18)

**21AH. Honors Calculus** (4) I. The Staff

Lecture-discussion—4 hours. Prerequisite: a Precalculus Qualifying Examination score significantly higher than the minimum for course 21A is required. More intensive treatment of material covered in course 21A.

**21B. Calculus** (4) I, II, III. The Staff

Lecture-discussion—4 hours. 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 integrals, surface of revolution. Only two units of credit will be allowed students who have received credit for course 16B or 16C.

**21BH. Honors Calculus (4) II.** The Staff

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.

**21C. Calculus (4) I, II, III.** The Staff

Lecture-discussion—4 hours. Prerequisite: course 21B or 21BH. Continuation of course 21B. Sequences, series, tests for convergence, Taylor expansions. Partial derivatives, total differentials. Applications to maximum and minimum problems in two or more variables. Definite integrals over plane and solid regions in various coordinate systems. Applications to physical systems.

**21CH. Honors Calculus (4) III.** The Staff

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.

**22A. Linear Algebra (3) I, II, III.** The Staff

Lecture—3 hours. Prerequisite: nine units of college mathematics. Matrices and linear transformations, determinants, complex numbers, quadratic forms. (Courses 22A, 22B, 22C may be taken in any order. However, if enrolled in Physics 9 sequence, 9B-9C-9D, courses should be taken in reverse order, 22C, 22B, 22A.)

**22AH. Honors Linear Algebra (3) III.** The Staff

Lecture—3 hours. Prerequisite: a grade of B or better in course 22B or 22BH. More intensive treatment of material covered in course 22A.

**22B. Differential Equations (3) I, II, III.** The Staff

Lecture—3 hours. Prerequisite: course 21C. Solutions of elementary differential equations. (CAN Math 24)

**22BH. Honors Differential Equations (3) II.** The Staff

Lecture—3 hours. Prerequisite: a grade of B or better in course 22C or 22CH. More intensive treatment of material covered in course 22B.

**22C. Vector Analysis (3) I, II, III.** The Staff

Lecture—3 hours. Prerequisite: course 21C. Vector algebra, vector calculus. Scalar and vector fields. Line and surface integrals. Green's theorem, Stokes' theorem, divergence theorem.

**22CH. Honors Vector Analysis (3) I.** The Staff

Lecture—3 hours. Prerequisite: a grade of B or better in course 21C or 21CH. More intensive treatment of material covered in course 22C.

**36. Fundamentals of Mathematics (3) I.** The Staff

Lecture—3 hours. Introduction to fundamental mathematical ideas selected from the principal areas of modern mathematics. Properties of the primes, the fundamental theorem of arithmetic, properties of the rationals and irrationals, binary and other number systems. Not open to those who have received credit for course 108.

**71A-71B. Explorations in Elementary Mathematics (3-3) I, II.** The Staff (Chairperson in charge)

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. Enrollment limited to students in multiple subject credential program. (Deferred grading only, pending completion of sequence.)

**98. Directed Group Study (1-5) I, II, III.** The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses**

**108. Introduction to Abstract Mathematics (4) I, II.**

III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Rigorous treatment of abstract mathematics with the emphasis on developing ability to understand and present mathematics arguments.

**\*114. The Theory of Convex Sets (3) III.** The Staff

Lecture—3 hours. Prerequisite: courses 21C, 22A, 108; or consent of instructor. Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry. Offered in even-numbered years.

**115A. The Theory of Numbers (3) I.** Alder

Lecture—3 hours. Prerequisite: course 108. Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers.

**\*115B. The Theory of Numbers (3) II.** Alder

Lecture—3 hours. Prerequisite: course 108. Euler function, Moebius function, congruences, primitive roots, quadratic reciprocity law. Offered in even-numbered years.

**\*115C. The Theory of Numbers (3) III.** Alder

Lecture—3 hours. Prerequisite: course 108. Continued fractions, partitions. Offered in even-numbered years.

**116. Metric Differential Geometry (3) III.** The Staff

Lecture—3 hours. Prerequisite: courses 22A, 22C; or consent of instructor. Vector analysis, curves and surfaces in three dimensions. Offered in odd-numbered years.

**118A. Partial Differential Equations: Elementary Methods (3) I.** The Staff

Lecture—3 hours. Prerequisite: courses 22A, 22B, 22C. 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.

**118B. Partial Differential Equations: Eigenfunction Expansions (3) II.** The Staff

Lecture—3 hours. 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.

**118C. Partial Differential Equations: Green's Functions and Transforms (3) III.** The Staff

Lecture—3 hours. 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.

**119. Theory of Ordinary Differential Equations (3) I.** The Staff

Lecture—3 hours. Prerequisite: courses 22A, 22B. Existence and uniqueness of solutions of ordinary differential equations, matrix solutions of linear systems, linearization of nonlinear equations, local behavior near a critical point and stability theory.

**121A-121B. Advanced Calculus for the Sciences (3-3) I-II.** The Staff

Lecture—3 hours. Prerequisite: courses 22A, 22B, 22C. Multidimensional calculus, Fourier series, calculus of variations, special functions, distributions, integral transforms, estimation and inequalities. Intended primarily for students majoring in science, engineering, and applied mathematics.

**\*125. Introduction to Mathematical Logic (3) I.**

Krom

Lecture—3 hours. Prerequisite: course 108. Propositional calculus, predicate calculus, normal forms, completeness. Offered in odd-numbered years.

**126. Introduction to the Theory of Sets (3) III.** The Staff

Lecture—3 hours. Prerequisite: course 108 or consent of instructor. Fundamental concepts including cardinal numbers, order types, ordinal numbers. Offered in odd-numbered years.

**127A-127B-127C. Advanced Calculus (4-4-4) I-II-III.** The Staff

Lecture—3 hours; extensive reading and problem solving. Prerequisite: courses 22A, 22C; course 108 (may be taken concurrently with consent of instructor). Real number system, continuity, differentiation and integration on the real line; vector calculus and functions of several variables; theory of convergence.

**128A. Numerical Analysis (4) I.** The Staff

Lecture—3 hours; term project. Prerequisite: course 21C; knowledge of a programming language such as Pascal, FORTRAN or BASIC. Error analysis, approximation, interpolation, numerical differentiation and integration.

**128B. Numerical Analysis in Solution of Equations (4) II.** The Staff

Lecture—3 hours; term project. Prerequisite: course 21C and 22A; knowledge of a programming language such as Pascal, FORTRAN or BASIC. Solution of nonlinear equations and nonlinear systems. Minimization of functions of several variables. Simultaneous linear equations. Eigenvalue problems.

**128C. Numerical Analysis in Differential Equations (4) III.** The Staff

Lecture—3 hours; term project. Prerequisite: courses 22A, 22B, and a knowledge of a programming language such as Pascal, FORTRAN or BASIC. Difference equations, operators, numerical solution of ordinary and partial differential equations.

**131. Methods of Mathematical Probability (4) II.**

The Staff

Lecture—4 hours. Prerequisite: courses 21C and 22A. Probability space, event, combinatorics; discrete, continuous distributions; random variables; joint, marginal conditional densities; transformation; expectation; sums and moments; inequalities; laws of large numbers; central limit law; probability models via conditioning; tables. Students who have had Statistics 131A may not receive credit for this course.

**132A-132B. Introduction to Stochastic Processes (3-3) III-II.** The Staff

Lecture—3 hours. Prerequisite: course 131 or Statistics 131A. Markov chains, Poisson process, birth and death processes, renewal theory, queueing theory, Brownian motion, stationary processes. Course 132B is offered in even-numbered years.

**141. Euclidean Geometry (3) II.** The Staff

Lecture—3 hours. Prerequisite: course 108. An axiomatic and analytic examination of Euclidean geometry from an advanced point of view. In particular, a discussion of its relation to other geometries.

**145. Combinatorial Mathematics (3) III.** The Staff

Lecture—3 hours. Prerequisite: course 108. Combinatorial methods using basic graph theory counting methods, generating functions, and recurrence relations.

**\*147. Topology (3) III.** The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: course 108. Basic notions of point-set and combinatorial topology. Offered in even-numbered years.

**150A-150B-150C. Introduction to Abstract Algebra (4-4-4) I, II, III.** The Staff

Lecture-discussion—4 hours. Prerequisite: course 108. Basic concepts of groups, rings, and fields. Emphasizes the techniques used in the proofs of the ideas (Lemmas, Theorems, etc.) developing these concepts. Develops precise thinking, precise writing, and the ability to deal with abstraction.

**160. Mathematical Foundations of Database Theory, Design, and Performance (3) I.** Diederich

Lecture—3 hours. Prerequisite: course 108 and familiarity with one high-level computer language. The 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.

**164. Mathematical Foundations of Fifth Generation Computing** (3) II. Milton

Lecture—3 hours. Prerequisite: course 108 and a modern high-level computer language. Study of the uses of predicate and various logics in knowledge-based systems. Resolution and non-resolution deduction, forward and backward deduction systems, logic programming, symbolic integration, problem solving strategies, functions in search strategies, mathematical treatment of uncertainty in expert systems.

**167. Linear Algebra and Applications** (3) II. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: course 22A. Introduction to linear algebra: linear equations, orthogonal projections, similarity transformations, quadratic forms, eigenvalues and eigenvectors. Applications to physics, engineering, economics, biology and statistics.

**168. Mathematical Programming** (3) III. The Staff

Lecture—3 hours. Prerequisite: courses 21C, and 22A or 167; knowledge of a programming language. Linear programming, simplex method. Basic properties of unconstrained nonlinear problems, descent methods, conjugate direction method. Constrained minimization.

**180. Special Topics: Pure and Applied Mathematics** (2-3) I, II, III. The Staff

To be arranged by students and instructor. Prerequisite: course 22A-22B-22C or consent of instructor. Special topics from various fields of pure and applied mathematics. Topics selected based on mutual interests of students and faculty. May be repeated for credit in different subject area.

**185A. Functions of a Complex Variable with Applications** (3) II. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: course 22C. Complex number systems, analyticity and the Cauchy-Riemann equations, elementary functions, complex integration, power and Laurent series expansions, residue theory.

**\*185B. Functions of a Complex Variable with Applications** (3) III. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: course 185A or consent of instructor. Analytic 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 even-numbered years.

**192. Internship in Applied Mathematics** (1-3) I, II, III. The Staff (Chairperson in charge)

Work-learn experience; final report. Prerequisite: upper division standing; project approval by faculty sponsor prior to enrollment. Supervised work-learn experience in applied mathematics. May be repeated for credit for a total of 10 units. (P/NP grading only.)

**194. Undergraduate Thesis** (3) I, II, III. The Staff

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.)

**197TC. Tutoring Mathematics in the Community** (1-5) I, II, III. The Staff (Chairperson in charge)

Seminar—1-2 hours; laboratory—2-6 hours. Prerequisite: upper division standing and consent of instructor. Special projects in mathematical education which involve the development of techniques for mathematics instruction and tutoring on an individual or small group basis. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)**Graduate Courses****201A-201B-201C. Real and Complex Analysis** (4-4-4) I-II-III. The Staff

Lecture—3 hours; discussion or paper (instructor's option). Prerequisite: course 127C or 203C. Abstract integration, Lebesgue measures,  $L^p$  spaces, complex measures, holomorphic functions, Cauchy's theorem, Riemann mapping theorem, and analytic continuation.

**201D. Real and Complex Analysis** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 201C. Riemann mapping theorem and analytic continuation.

**202A. Functional Analysis** (4) II. The Staff

Lecture—3 hours; term paper. Prerequisite: course 201D. Introduction to topological vector spaces. Metrization, Banach-Steinhaus theorem, the open mapping theorem, the closed graph theorem, the Hahn-Banach theorem. Duality and convexity. Weak topologies. Applications. Offered in odd-numbered years.

**202B. Functional Analysis** (4) III. The Staff (Chairperson in charge)

Lecture—3 hours; discussion—1 hour. Prerequisite: course 202A. One of the following topics will be covered: (a) distributions and Fourier transforms and their applications to partial differential equations; (b) theory of bounded and unbounded linear operators and their spectral decomposition; (c) non-linear functional analysis. Offered in odd-numbered years.

**203A-203B. Modern Applied Analysis** (3-3) I-II. The Staff

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Classical mathematical foundations leading to modern analysis. Linear and metric spaces; Hilbert space; operator theory. Applications to integral and differential equations. Variational methods.

**203C. Modern Applied Analysis** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 203B. Applications to integral and differential equations. Variational methods.

**204. Applied Asymptotic Analysis** (3) I. The Staff

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Asymptotic analysis and perturbation theory, with applications to optimization, differential equations, and scaling.

**210A. Topics in Geometry** (3) I. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: bachelor's degree in mathematics or consent of instructor. Topics in advanced geometry related to curriculum at all levels. Required for M.A.T. degree program for prospective teachers. May be repeated for credit with prior consent of instructor.

**210AL. Topics in Geometry: Discussion** (1) I. The Staff (Chairperson in charge)

Lecture-discussion—1 hour (to be arranged). Prerequisite: course 210A (concurrently); consent of instructor. Special topics related to course 210A which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

**210B. Topics in Algebra** (3) II. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: bachelor's degree in mathematics or consent of instructor. Topics in advanced algebra related to curriculum at all levels. Required for M.A.T. degree program for prospective teachers. May be repeated for credit with prior consent of instructor.

**210BL. Topics in Algebra: Discussion** (1) II. The Staff (Chairperson in charge)

Lecture-discussion—1 hour (to be arranged). Prerequisite: course 210B (concurrently); consent of instructor. Special topics related to course 210B which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

**210C. Topics in Analysis** (3) III. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: bachelor's degree in

mathematics or consent of instructor. Topics in advanced analysis related to curriculum at all levels. Required for M.A.T. degree program for prospective teachers. May be repeated for credit with prior consent of instructor.

**210CL. Topics In Analysis: Discussion** (1) III. The Staff (Chairperson in charge)

Lecture-discussion—1 hour (to be arranged). Prerequisite: course 210C (concurrently); consent of instructor. Special topics related to course 210C which are of special interest to teachers and candidates for M.A.T. degree program. May be repeated for credit.

**\*213A-213B-213C. Stochastic Dynamics and Applications** (3-3-3) I-II-III. The Staff

Lecture—3 hours. Prerequisite: course 201C or 235C or consent of instructor. Stochastic processes including Gaussian, Markov and stationary processes. Diffusion, martingales, stochastic differential equations. Applications and advanced topics. Offered in odd-numbered years.

**215A-215B-215C. Topology** (4-4-4) I-II-III. The Staff (Chairperson in charge)

Lecture—3 hours; discussion—1 hour or paper (instructor's option). Prerequisite: graduate standing in mathematics or consent of instructor. Topics selected from point-set topology, homotopy theory, and homology theory. Offered in even-numbered years.

**218A-218B. Partial Differential Equations** (3-3) II-III. The Staff

Lecture—3 hours. Prerequisite: courses 22A, 127C. Topics from the theory of partial differential equations and integral equations. Offered in odd-numbered years.

**\*219A-219B. Ordinary Differential Equations** (3-3) II-III. The Staff

Lecture—3 hours. Prerequisite: courses 22A, 127C. Ordinary differential equations in the real and complex domains; existence and uniqueness theorems; linear systems; analysis of singular points; Sturm-Liouville theory; asymptotic expansions. Offered in even-numbered years.

**\*221A-221B. Mathematical Fluid Dynamics** (3-3) I-II. The Staff

Lecture—3 hours. Prerequisite: course 118B. Dynamics of fluid motion, perfect fluids, rotational and irrotational motion, two-dimensional and three-dimensional axisymmetric flows, compressible and incompressible viscous fluids. Offered in odd-numbered years.

**\*225A-225B. Metamathematics** (3-3) II-III. Krom

Lecture—3 hours. Prerequisite: course 126 or the equivalent. Axiomatizability, consistency, and completeness of the formalized mathematical theories; definability in formal languages; topics from the theory of models. Offered in even-numbered years.

**228A-228B-228C. Numerical Solution of Differential Equations** (3-3-3) I-II-III. The Staff

Lecture—3 hours. 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 even-numbered years.

**\*229A-229B. Numerical Methods in Linear Algebra** (3-3) I-II. The Staff

Lecture—3 hours. Prerequisite: consent of instructor. Computational methods for the solution of linear algebraic equations and matrix eigenvalue problems. Analysis of direct and iterative methods. Special methods for sparse matrices. Offered in odd-numbered years.

**235A-235B-235C. Probability Theory** (3-3-3) I-II-III. The Staff

Lecture—3 hours. Prerequisite: course 127C and Statistics 131A-131B or the equivalent. Measure theoretic foundations, abstract integrations, modes of convergence, limit theorems, independence, laws of large numbers, characteristic functions, central limit theorem, conditional expectations; topics from discrete time Markov and stationary processes, ergodic

theory, Brownian motion, weak convergence, Wiener and Poisson processes.

**\*240A-240B-240C. Differential Geometry** (3-3) I-II-III. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: course 116 or consent of instructor. Introduction to differentiable manifolds, the tangent bundle, tensor fields, differential forms. DeRham cohomology, connections, Lie groups, Riemannian geometry. Offered in odd-numbered years.

**\*250A-250B-250C. Algebra** (4-4-4) I-II-III. The Staff (Chairperson in charge)

Lecture—3 hours; discussion—1 hour or paper (instructor's option). Prerequisite: graduate standing in Mathematics or consent of instructor. Theory of groups, rings, and fields. Offered in odd-numbered years.

**\*270. Foundations of Optimization** (3) I. The Staff

Lecture—3 hours. Prerequisite: course 203 or 127. Theory of linear and nonlinear programming: convexity, optimality conditions, duality, approximation, subdifferentiability. Goal is to acquaint student with the basic tools to derive optimality (and equilibria) for optimization problems in finite dimensions. Offered in odd-numbered years.

**\*271. Dynamical Optimization** (3) II. The Staff

Lecture—3 hours. Prerequisite: course 203 or 127. Calculus of variations, optimal control, Pontryagin's maximal principle, optimality principle of dynamic programming. Goal is to provide student with the mathematical foundations of control theory and the calculus of variations. Offered in even-numbered years.

**\*272. Numerical Optimization** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 203 or 127. Unconstrained and constrained optimization, second order methods (Newton, quasi-Newton, sequential quadratic programming), large-scale optimization techniques, global optimization. Course goal is to acquaint students with the major techniques developed for optimization problems. Offered in even-numbered years.

**280. Topics in Pure and Applied Mathematics** (1-3) I, II, III. The Staff

Lecture—1-3 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 in different subject area.

**290. Seminar** (1-6) I, II, III. The Staff (Chairperson in charge)

Advanced study in various fields of mathematics, including the following: algebraic theory of semi-groups, control theory, mathematical logic, mathematical statistics, ordinary differential equations, partial differential equations, theory of distributions, and univalent functions. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

**299. Individual Study** (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

**299D. Dissertation Research** (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

### Professional Courses

**300A. The Teaching of Mathematics, K-9** (3) I. The Staff

Lecture, discussion, laboratory, and field work—2-6 hours. Prerequisite: senior or graduate standing, simultaneous teaching experience, and sufficient background for the successful completion of the mathematics portion of the Commission for Teaching Preparation. Mathematics curriculum and teaching methods for grades K-9. Arrangements for enrollment in the course must be made at the beginning of the fall quarter through the Education Division.

**\*301A-301B. Mathematics Teaching Practicum** (3-3) I-II. The Staff (Chairperson in charge)

Laboratory—6 hours. Prerequisite: concurrent

enrollment in course sequences 302 and 303 or consent of instructor. Specialist training in mathematics teaching. Required for advanced degrees in mathematics education. Sequence requires a strong undergraduate program in the mathematical sciences and may be repeated once for credit.

**\*302A-302B. Curriculum Development in Mathematics** (1-1) I-II. The Staff (Chairperson in charge)

Lecture—1 hour. Prerequisite: concurrent enrollment in course sequence 303 or consent of instructor. Mathematics curriculum development for all grade levels. Required for advanced degrees in mathematics education. Course requires a strong undergraduate mathematics program. The sequence may be repeated once for credit with consent of instructor.

**\*303A-303B. Mathematics Pedagogy** (1-1) I-II. The Staff (Chairperson in charge)

Lecture—1 hour. Prerequisite: concurrent enrollment in course sequence 302 or consent of instructor. An investigation of the interplay of mathematical pedagogy and mathematical content, including a historical survey of past and present methods and the influences that shaped their development. The sequence may be repeated once for credit with consent of instructor.

**390. Methods of Teaching Mathematics** (3) I, II, III. The Staff

Lecture—1 hour; discussion—1 hour; laboratory—2 hours. Prerequisite: graduate standing. Practical experience in methods and problems of the teaching of mathematics at the university level. Includes discussion of lecturing techniques, analysis of tests and supporting material, preparation and grading of examinations, and related topics. Required of departmental teaching assistants. May be repeated for credit. (S/U grading only.)

## Medical Microbiology

### See Medicine, School of

## Medicine

### See Medicine (School of); and Medicine (Veterinary Medicine)

## Medicine, School of

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James J. Castles, M.D., Executive Associate Dean

Edward C. Gomez, M.D., Ph.D., Associate Dean

Edward J. Hurley, M.D., Associate Dean

Ernest L. Lewis, M.D., Associate Dean

Frank J. Loge, M.B.A., Associate Dean

Donal A. Walsh, Ph.D., Associate Dean

Jason R. Barr, M.Ed., Assistant Dean

Dean's Office, Medical Sciences 1C (916-752-0331)

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 Michael D. McGinn, Ph.D., Assistant Adjunct Professor (*Otolaryngology*)  
 Thomas P. McGraw, Ph.D., Assistant Adjunct Professor (*Pathology*)  
 Arnold Meadow, Ph.D., Professor (*Psychiatry*)  
 Janet E. Meizel, Lecturer (*Family Practice*)  
 Stanley Meizel, Ph.D., Professor (*Human Anatomy*)  
 Janet Mentink, R.N., Lecturer (*Family Practice*)  
 Frederick J. Meyers, M.D., Associate Professor (*Internal Medicine, Pathology*)  
 Lorraine Millo, M.D., Assistant Professor in Residence (*Obstetrics and Gynecology*)  
 Claramae H. Miller, Ph.D., Associate Professor of Clinical Pathology, Internal Medicine (*Clinical Pathology, Internal Medicine*)  
 Jay M. Milstein, M.D., Associate Professor in Residence (*Pediatrics*)  
 Anne E. Missavage, M.D., Assistant Professor (*Surgery*)  
 Connie Mitchell, M.D., Assistant Professor of Clinical Internal Medicine (*Internal Medicine*)  
 Paul Mole, Ph.D., Associate Professor (*Physical Education*)  
 Pasquale X. Montesano, M.D., Assistant Professor in Residence (*Orthopaedic Surgery*)  
 Michael Moran, M.D., Assistant Professor in Residence (*Urology*)  
 Walter Morgan, M.D., Associate Professor of Clinical Family Practice (*Clinical Family Practice*)  
 Vera Morhenn, M.D., Associate Professor in Residence (*Dermatology*)  
 Thomas L. Morrison, Ph.D., Associate Professor in Residence (*Psychiatry*)  
 Lawrence Morse, M.D., Assistant Professor in Residence (*Ophthalmology*)  
 Rodney L. Moser, M.H.S., Lecturer (*Family Practice*)
- Ralph M. Moskowitz, M.D., Assistant Professor in Residence (*Internal Medicine*)  
 Christopher J. Murphy, D.V.M., Ph.D., Assistant Adjunct Professor (*Ophthalmology*)  
 Jerome Murphy, M.D., Assistant Professor in Residence (*Pediatrics*)  
 Tsutomu Nakada, M.D., Associate Professor in Residence (*Neurology*)  
 Thomas Nesbitt, M.D., Assistant Professor of Clinical Family Practice (*Family Practice*)  
 Kenneth R. Niswander, M.D., Professor Emeritus (*Obstetrics and Gynecology*)  
 Thomas E. Nordahl, M.D., Ph.D., Assistant Professor (*Psychiatry*)  
 Robert H. Noth, M.D., Associate Professor in Residence (*Internal Medicine*)  
 Uniyime Nseyo, M.D., Assistant Professor in Residence (*Urology*)  
 Lois F. O'Grady, M.D., Professor (*Internal Medicine*)  
 Ronan O'Rahilly, M.D., Professor (*Human Anatomy, Neurology*)  
 Richard H. Oi, M.D., Professor of Clinical Obstetrics and Gynecology (*Obstetrics and Gynecology, Pathology*)  
 Claude Organ, M.D., Professor (*Surgery*)  
 Rosemary A. Orgren, Ph.D., Assistant Adjunct Professor (*Community Health*)  
 James W. Overstreet, M.D., Ph.D., Professor (*Human Anatomy, Obstetrics and Gynecology*)  
 John M. Palmer, M.D., Professor (*Urology*)  
 Philip E.S. Palmer, M.D., F.R.C.P., Professor (*Radiology*)  
 Demosthenes Pappagianis, M.D., Ph.D., Professor (*Medical Microbiology and Immunology*)  
 Mark Parrish, M.D., Associate Professor (*Pediatrics*)  
 Gibbe H. Parsons, M.D., Associate Professor (*Internal Medicine*)  
 Hugh Patterson, Ph.D., Adjunct Lecturer (*Human Anatomy*)  
 Stephen Phillips, M.D., Assistant Professor in Residence (*Internal Medicine*)  
 Stephen D. Phinney, M.D., Ph.D., Assistant Professor in Residence (*Internal Medicine*)  
 Neville R. Pimstone, M.D., Professor (*Internal Medicine*)  
 Virginia C. Poirier, M.D., Assistant Professor of Clinical Radiology (*Clinical Radiology*)  
 Thomas P. Prindiville, M.D., Assistant Professor in Residence (*Internal Medicine*)  
 George T. Rab, M.D., Professor (*Orthopaedic Surgery*)  
 Lawrence Rabinowitz, Ph.D., Professor (*Human Physiology*)  
 Antolin Raventos, M.D., Professor in Residence (*Radiology*)  
 Stanley B. Reich, M.D., Professor in Residence (*Radiology*)  
 Ted W. Reid, Ph.D., Professor in Residence (*Ophthalmology*)  
 Michael Reinhart, M.D., Associate Professor of Clinical Pediatrics (*Clinical Pediatrics*)  
 John A. Reitan, M.D., Professor (*Anesthesiology*)  
 Michael P. Reimer, M.D., Professor in Residence (*Neurology*)  
 Eugene M. Renkin, Ph.D., Professor (*Human Physiology*)  
 Kenneth J. Rhee, M.D., Assistant Professor of Clinical Internal Medicine (*Internal Medicine*)  
 Mack Roach, M.D., Assistant Professor in Residence (*Diagnostic Radiology*)  
 Dick L. Robbins, M.D., Associate Professor (*Internal Medicine*)  
 John A. Robbins, M.D., Associate Professor of Clinical Internal Medicine (*Clinical Internal Medicine*)  
 David M. Robinson, M.D., Assistant Professor of Clinical Anesthesiology (*Anesthesiology*)  
 Juan J. Rodrigo, M.D., Professor (*Orthopaedic Surgery*)  
 Carl J. Rosenquist, M.D., Professor (*Radiology*)  
 Alan M. Roth, M.D., Professor (*Ophthalmology, Pathology*)  
 Robert B. Rucker, Ph.D., Professor (*Biological Chemistry*)  
 Boris Ruebner, M.D., Professor (*Pathology*)

## 300 Medicine, School of

Liisa Russell, M.D., Assistant Professor (*Pathology*)  
John Rutledge, M.D., Assistant Professor in Residence (*Internal Medicine*)  
Amira Safwat, M.B.B.C.A., Professor of Clinical Anesthesiology (*Clinical Anesthesiology*)  
Stanley Salinda, M.D., Instructor in Residence (*Internal Medicine*)  
Steven J. Samuels, Ph.D., Associate Adjunct Professor (*Internal Medicine, Obstetrics and Gynecology*)  
Ethelda N. Sassenrath, Ph.D., Associate Professor in Residence Emeritus (*Psychiatry*)  
Marc B. Schenker, M.D., Associate Professor (*Internal Medicine*)  
Thomas W. Schlech, Ph.D., Adjunct Professor (*Chemistry*)  
Barbara Schneeman, Ph.D., Professor (*Internal Medicine*)  
Philip Schneider, M.D., Ph.D., Associate Professor in Residence (*Surgery*)  
Scott R. Schulman, M.D., Assistant Professor (*Anesthesiology*)  
Ivan Schwab, M.D., Associate Professor of Clinical Ophthalmology (*Ophthalmology*)  
Marshall Z. Schwartz, M.D., Professor (*Surgery*)  
Robert J. Scibienksi, Ph.D., Associate Professor (*Medical Microbiology and Immunology*)  
Robert P. Scobey, Ph.D., Professor (*Human Physiology, Neurology, Ophthalmology*)  
Sidney A. Scudder, M.D., Assistant Professor in Residence (*Hematology, Oncology*)  
James A. Seibert, Ph.D., Associate Professor in Residence (*Radiology*)  
Craig W. Senders, M.D., Assistant Professor (*Otolaryngology*)  
Masud Seyal, M.B.B.S., Associate Professor (*Neurology*)  
Azad A. Sheikh, M.B.B.S., Visiting Assistant Professor  
Allan D. Sieffkin, M.D., Associate Clinical Professor (*Internal Medicine*)  
Karen A. Sigvardt, Ph.D., Assistant Adjunct Professor (*Neurology*)  
Joseph Silva, M.D., Professor (*Internal Medicine*)  
Helayne Silver, M.D., Assistant Professor in Residence (*Obstetrics and Gynecology*)  
Robert Slotnick, M.D., Assistant Professor in Residence (*Obstetrics and Gynecology*)  
Lloyd Smith, M.D., Assistant Professor in Residence (*Obstetrics and Gynecology*)  
Robert E. Smith, Ph.D., Associate Professor (*Human Physiology*)  
Elizabeth M. Smithwick, M.D., Professor (*Pediatrics*)  
J. Stuart Soeldner, M.D., Professor (*Internal Medicine*)  
Robert C. Stadnik, M.D., Professor (*Radiology*)  
Larry G. Stark, Ph.D., Professor (*Pharmacology*)  
Charles L. Stebbins, Ph.D., Assistant Professor in Residence (*Internal Medicine, Human Physiology*)  
Judith Stern, Ph.D., Professor (*Internal Medicine*)  
Thomas Stevenson, M.D., Associate Professor (*Surgery*)  
Margaret S. Steward, Ph.D., Professor (*Psychiatry*)  
Dennis Stewart, Ph.D., Assistant Adjunct Professor (*Obstetrics and Gynecology*)  
Elma S. Stewart, F.N.P., Visiting Lecturer (*Family Practice*)  
Anthony R. Stone, M.D., Assistant Professor (*Urology*)  
Robert E. Stowell, M.D., Ph.D., Professor Emeritus (*Pathology*)  
Dennis Styne, M.D., Associate Professor (*Pediatrics*)  
Arthur Swislocki, M.D., Assistant Professor in Residence (*Internal Medicine*)  
Glenn T. Syfstad, Ph.D., Associate Professor in Residence (*Orthopaedic Surgery*)  
Jonathan Sykes, M.D., Instructor in Residence (*Otolaryngology*)  
Michael Syanan, Ph.D., Associate Professor in Residence (*Medical Microbiology and Immunology*)  
Robert M. Szabo, M.D., Associate Professor (*Orthopaedic Surgery*)  
Robert C. Tait, Ph.D., Assistant Adjunct Professor (*Neurology*)  
Jeffrey L. Tanji, M.D., Assistant Professor (*Family Practice*)

Raymond L. Teplitz, M.D., Professor (*Pathology*)  
Henry Teslik, M.D., Professor of Clinical Pathology (*Clinical Pathology*)  
Seth Thaller, M.D., Assistant Professor in Residence (*Surgery*)  
Jerold H. Theis, D.V.M., Ph.D., Professor (*Medical Microbiology and Immunology*)  
Charles E. Thirkill, Ph.D., Assistant Adjunct Professor (*Ophthalmology*)  
Duane E. Townsend, M.D., Professor (*Obstetrics and Gynecology*)  
Robert R. Traut, Ph.D., Professor (*Biological Chemistry*)  
Colin R. Tredrea, M.B.B.S., Assistant Professor of Clinical Anesthesiology (*Anesthesiology*)  
John D. Treford, M.D., Professor (*Obstetrics and Gynecology*)  
George Triadafilopoulos, M.D., Assistant Professor in Residence (*Internal Medicine*)  
Joann M. Trolinger, M.H.S., Visiting Lecturer (*Family Practice*)  
Frederic A. Troy II, Ph.D., Professor (*Biological Chemistry*)  
Walter Trudeau, M.D., Clinical Professor (*Internal Medicine*)  
Francis Tsao, M.D., Instructor in Residence (*Otolaryngology*)  
Joe P. Tupin, M.D., Professor (*Psychiatry*)  
C. John Tupper, M.D., Professor (*Community Health, Internal Medicine, Family Practice*)  
Judith L. Turgeon, Ph.D., Professor (*Human Physiology*)  
Patrick L. Twomey, M.D., Associate Professor in Residence (*Surgery*)  
David Vera, Ph.D., Assistant Adjunct Professor (*Radiology*)  
Zakauddin Vera, M.D., Associate Professor (*Internal Medicine*)  
Vijaya K. Vijayan, M.D., Ph.D., Associate Professor (*Human Anatomy, Neurology*)  
John Vogel, M.D., Senior Lecturer (*Radiology*)  
Philip J. Vogt, M.D., Assistant Professor of Clinical Pathology (*Clinical Pathology*)  
Carolyn S. Waggoner, M.S., R.D., Adjunct Lecturer (*Internal Medicine, Nutrition*)  
Franklin C. Wagner, M.D., Professor (*Neurological Surgery*)  
Barbara Walker, M.D., Instructor in Residence (*Internal Medicine*)  
Donal A. Walsh, Ph.D., Professor (*Biological Chemistry*)  
Robert M. Walter, Jr., M.D., Associate Professor (*Internal Medicine*)  
Richard F. Walters, M.D., Professor (*Family Practice*)  
Richard E. Ward, M.D., Professor (*Surgery*)  
Dennis W. Waring, Ph.D., Assistant Professor in Residence (*Human Physiology*)  
Worden Waring, Ph.D., Professor Emeritus (*Physical Medicine and Rehabilitation, Human Physiology*)  
Edward J. Watson-Williams, M.D., Professor Emeritus of Clinical Internal Medicine (*Clinical Internal Medicine*)  
Phillip G. Weiler, M.D., Professor of Clinical Community Health (*Clinical Community Health*)  
Jeana Welborn, M.D., Assistant Professor in Residence (*Internal Medicine*)  
Sefton R. Wellings, M.D., Ph.D., Professor Emeritus (*Pathology*)  
David Wells, M.D., Assistant Professor of Clinical Anesthesiology (*Anesthesiology*)  
Richard P. Wennberg, M.D., Professor (*Pediatrics*)  
William Wenner, M.D., Assistant Professor in Residence (*Pediatrics*)  
Robert T. Wertz, Ph.D., Adjunct Professor (*Neurology*)  
Theodore C. West, Ph.D., Professor Emeritus (*Pharmacology*)  
Ronald G. Wheeland, M.D., Associate Professor in Residence (*Dermatology*)  
David A. White, M.D., Assistant Professor in Residence (*Anesthesiology*)  
Lynda L. White, M.H.S., Lecturer (*Family Practice*)  
Richard H. White, M.D., Associate Clinical Professor (*Internal Medicine*)  
Connie Whiteside, M.D., Associate Professor of Clinical Internal Medicine (*Internal Medicine*)

Lynn M. Wiley, Ph.D., Associate Professor in Residence (*Obstetrics and Gynecology*)  
Hibbard E. Williams, M.D., Professor (*Internal Medicine*)  
Mark C. Williams, M.D., Assistant Professor in Residence (*Obstetrics and Gynecology*)  
Lowell D. Wilson, M.D., Ph.D., Professor (*Internal Medicine, Biological Chemistry*)  
Garen Winternute, M.D., Associate Professor (*Family Practice*)  
Wallace D. Winters, M.D., Ph.D., Professor (*Anesthesiology, Pharmacology*)  
David H. Wisner, M.D., Assistant Professor in Residence (*Surgery*)  
Hanspeter Witschi, M.D., Professor in Residence (*Internal Medicine*)  
Bruce M. Wolfe, M.D., Professor (*Surgery*)  
Earl F. Wolfman, Jr., M.D., Professor (*Surgery*)  
David L. Woods, Ph.D., Associate Adjunct Professor (*Neurology*)  
Hiroshi Yamauchi, M.D., Professor Emeritus (*Clinical Internal Medicine*)  
Julian R. Youmans, M.D., Ph.D., Professor (*Neurological Surgery*)  
Jerome Zeldis, M.D., Assistant Professor (*Internal Medicine*)  
Vincent Ziboh, Ph.D., Professor (*Dermatology, Biological Chemistry*)

**Admission Requirements and Professional Curriculum.** Detailed information can be obtained from the School of Medicine. See also the School of Medicine section in the front portion of this catalog.

## Courses in the School of Medicine

### Curriculum for the School of Medicine

The curriculum for the M.D. degree at the University of California, Davis School of Medicine is a four-year program to provide comprehensive training for the practice of medicine. It offers a blend of basic science training and clinical experience with opportunities for research. While the first two years emphasize the basic science basis of medicine, the student is exposed even from the onset to questions of patient management, thus providing a natural transition from the entry pregraduate training into the clinical training of the final two years.

The first-year program is for three quarters, beginning in the Fall. The basic sciences (anatomy, physiology, biochemistry, immunology, general pathology) are blended with social sciences (the behavioral aspects of medicine), and students are introduced to the art of communicating with patients, and emergency medicine. The second-year program is for four quarters, but with the Summer Quarter abbreviated to six weeks. The Summer Quarter provides a transition between basic and clinical sciences with the presentation of systematic pathology, and courses on the integumentary system and reproductive system. In the remaining three quarters, the students complete their training in basic sciences (pharmacology, microbiology) and are then, from an organ system approach, presented the pathophysiological basis of disease (endocrine, hematopoietic/lymphoreticular, gastrointestinal, nutrition, musculoskeletal, neuromuscular, respiratory, nephrology). During the second year, students continue training in physical diagnosis, are introduced to laboratory diagnostic techniques, and are presented with issues in community health, occupational medicine, psychopathology, and human sexuality. The third-year program is comprised of required clerkship rotations in the clinical specialties: twelve weeks of surgery, twelve weeks of medicine, and eight weeks each of obstetrics/gynecology, pediatrics and psychiatry.

In the fourth year of the M.D. curriculum, flexibility is built in to allow students to begin to individualize their medical career. Twenty-four weeks of flexible clerkships include four weeks of neurology and/or neurosurgery, four weeks of ambulatory care, and sixteen weeks of clinical selectives. Each student is required to take two-week clerkships in physical medicine and rehabilitation, ophthalmology, otolaryn-

gology, and a two-week required experience in responsibilities of medical practice (medical ethics, jurisprudence, medical economics). The fourth year curriculum also allows for twelve weeks of undesignated time.

To satisfy the M.D. degree program, the student must successfully complete the required course work and clerkships. Students who enter the program with advanced training in one of the areas required for the program are permitted to substitute required courses with electives of equal credit. In addition to the fourth-year elective program available, there is some opportunity for selecting electives during the first two years, in particular during the interim period between the first and second years.

### First-Year Required Courses

UNITS

#### Quarter I: Fall

Biological Chemistry 410A, molecular and cell biology .....	4.5
Family Practice 400A, introduction to patient evaluation .....	2
Human Anatomy 400, developmental, gross and radiologic anatomy .....	9
Psychiatry 401, medicine and the mind .....	2

#### Quarter II: Winter

Biological Chemistry 410B, cell biology and metabolism .....	3.5
Human Anatomy 402, human microscopic anatomy .....	5
Human Physiology 400, human physiology .....	8
Family Practice 400B, introduction to patient evaluation .....	2

#### Quarter III: Spring

Biological Chemistry/Human Physiology 418, mammalian endocrinology and homeostasis .....	4.5
Human Anatomy/Human Physiology 403, neurobiology .....	5
Medical Microbiology 480A, basic and medical immunology .....	2.5
Pathology 411, Pathology I .....	5
Family Practice 400C, introduction to patient evaluation .....	2

### Second-Year Required Courses

#### Quarter IV: Summer

Pathology 423, Pathology II .....	7.5
Obstetrics and Gynecology/Pediatrics 420, reproduction/genetics/perinatology .....	2
Dermatology 420, integumentary system .....	2
Internal Medicine 400A, physical diagnosis .....	1

#### Quarter V: Fall

Medical Microbiology 480B, pathogenic microbiology .....	6.5
Internal Medicine 420A, hematopoietic and lymphoreticular system/nuclear medicine .....	5
Orthopaedic Surgery 420, musculoskeletal system .....	2.5
Pharmacology 400A, Principles of Pharmacology A .....	2.5

Community Health/Internal Medicine 402, epidemiology/community health/occupational medicine .....	2.5
Internal Medicine 400B, physical diagnosis .....	2

#### Quarter VI: Winter

Pharmacology 400B, Principles of Pharmacology B .....	6
Internal Medicine 420C, respiratory system .....	4
Internal Medicine 420D, cardiovascular system .....	3.5
Psychiatry 403, psychopathology .....	3.5
Psychiatry 402, human sexuality .....	1
Internal Medicine 400C, physical diagnosis .....	2

### Quarter VII: Spring

Internal Medicine 420F, metabolic-regulatory system .....	3.5
Internal Medicine 420B, gastrointestinal system ..	3
Internal Medicine/Biological Chemistry 419, basic and clinical nutrition .....	2
Internal Medicine 420E, nephrology .....	4
Neurology 420, neuromuscular pathophysiology ..	4
Internal Medicine 400D, physical diagnosis .....	2

### Third-Year Required Courses

### Medical Sciences (core courses)

#### Professional Courses

##### 430. Required Surgical Clerkship (12) I, II, III, IV.

Course Committee Chairperson

Clinical Clerkship—full time (8 weeks). Prerequisite: third-year medical student and approval by Committee on Student Evaluation and Promotion. Student required to take four weeks in General Surgery. Course also includes instruction in Anesthesia.

##### 431. Medicine Clerkship (18) I, II, III, IV.

Course Committee Chairperson

Clinical experience—full time (12 weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Two 6-week periods, one each at UCD Medical Center and at Martinez VA Hospital. Direct patient care situations under guidance of full-time or volunteer faculty member. Nights and weekend on-call. Completion of 24 full write-ups on patients for whom student will take special responsibility.

##### 432A. Obstetrics-Gynecology Clerkship (12) I, II, III, IV.

Course Committee Chairperson

Clinical experience—full time (8 weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Obstetric/neonatal/gynecologic experience in delivery room, nursery wards, operating room, clinics. One-third of time spent in gynecology, two-thirds of time in perinatology. Obstetrics, neonatology and continuing care of fetus-neonate emphasized in perinatal period. Seminars and conferences throughout period.

##### 432B. Pediatric Clerkship (12) I, II, III, IV.

Course Committee Chairperson

Clinical experience—full time (8 weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Two 4-week periods, one in inpatient rotation (UCD Medical Center or Travis AFB) and one in ambulatory experience (UCD Medical Center). Assumption of appropriate patient care responsibilities; participation in conference/rounds; and seminars during ambulatory rotation.

##### 433. Clinical Clerkship in Psychiatry (12) I, II, III, IV.

Course Committee Chairperson

Clinical experience—full time (8 weeks). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Students assigned to various mental health clinical settings following intensive orientation program. Focus on treatment of psychiatric problems encountered by physician in practice. Diagnostic, therapeutic, and interpersonal skills emphasized.

##### 440. Responsibilities of Medical Practice (3) II.

Davidson and staff

Lecture-discussion—60 hours total. Prerequisite: approval by Committee on Student Evaluation and Promotion. Students will address nonbiological components of the patient-physician relationship (medical ethics, medical jurisprudence, medical economics, alcoholism and drug abuse, etc.) and critically explore social, ethical and cultural issues arising in medical practice. (S/U grading only.)

### Fourth Year Requirements

#### Fourth Year Required Courses

Responsibilities of medical practice .....

2 weeks

Physical Medicine and Rehabilitation clerkship .....

2 weeks

Ear, Nose and Throat/Ophthalmology clerkships .....

4 weeks

#### Fourth Year Flexible Clerkships

Neurology and/or

4 weeks

Neurosurgery .....

4 weeks

Ambulatory Care .....

4 weeks

Clinical Selectives .....

16 weeks

The fourth year curriculum also allows for twelve weeks of undesignated time (electives, interviews, free time, etc.)

### Other Medical Sciences Courses

#### Professional Courses

##### 450. Introduction to UCD Medical Center (1) III.

The Staff

Seminar—20 hours total. Prerequisite: second-year medical student. Designed to assist medical student in transition from classroom to hospital setting. (S/U grading only.)

##### 480. Insights in Clinical Research (1) II.

Walsh Lecture—1 hour. Prerequisite: medical students in good standing. Clinical research presented by School of Medicine faculty; overview of pertinent issues, including medical ethics, human subjects protocols, case control methods, etc. (S/U grading only.)

##### 489. Directed Studies (9) IV.

O'Grady Independent study—40 hours weekly. Prerequisite: individual directed studies in extended preparation for National Board Examination, Part I, and/or as required by Promotion Board. Independent studies to review material from Years I and II in the curriculum in preparation for taking National Boards in the fall, and for remediation course work directed by the Promotion Board. Students are expected to spend 8 to 12 hours per day on these studies. Faculty consultation and tutoring available on individual basis. (S/U grading only.)

### Departmental Courses:

#### Anesthesiology

##### Upper Division Course

##### 192. Internship in Anesthesiology (1-6) I, II, III, IV.

The Staff (Bennett, Kien)

Work-learn experience—3 to 18 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work-learn experience in anesthesia and related fields. (P/NP grading only.)

#### Professional Courses

##### 420. Case Management Conference (1) I, II, III, IV.

The Staff

Discussion—1 hour. Prerequisite: interns and residents, advanced medical and veterinary students; consent of instructor. Informal discussion of current hospital case material presented by house officers, students and faculty. Clinical and research experience, combined with pertinent literature references, is brought to bear on the problems with emphasis on preventative as well as corrective measures.

##### 421. Basic Science Conference (1) I, II, III, IV.

The Staff (White in charge)

Discussion—1 1/2 hours. Prerequisite: advanced medical, veterinary, and graduate students; consent of instructor. Discussion of basic science material related directly to anesthesiology, particularly in the areas of physiology and pharmacology. Selected reading assignments are given in advance and utilized by the instructor to encourage discussion. In selected instances, the topics are organized and presented by the students and residents.

**460. Anesthesiology Clinical Clerkship (3-18) I, II, III, IV.** (Loeb in charge)  
Full-time clinical activity (3 full days per unit). Prerequisite: third- and fourth-year medical students. Provides experience in total anesthetic management including application of physiologic and pharmacologic principles to preoperative, operative and post-operative management of patients. Considers choice and management of general and regional anesthesia techniques, resuscitation, artificial ventilation, inhalation and fluid-electrolyte therapy and pain problems. Students electing portions of the course for credit, must receive consent of instructor. Limited enrollment.

**\*461. Anesthesia Surgical Team Participation:**

**Martinez VA Medical Center (6-9) I, II, III, IV.** Irwin Clinical clerkship—full time (4 to 6 weeks). Prerequisite: third- or fourth-year medical student; completion of Medical Sciences 430. Instruction in: (1) pre- and post-anesthesia care, (2) induction and maintenance of anesthesia, (3) hazards and complications of anesthesia, (4) monitoring (including invasive), (5) record keeping, (6) surgery requirements of anesthesia. All training is under staff direction.

**462. Airway and Mechanical Ventilation Management (3) II, III.** (Loeb in charge)

Clinical clerkship—full time (2 weeks). Introduce medicine student to endotracheal intubation, regulation of mechanical ventilators, and weaning from ventilatory support.

**480. Insights in Anesthesiology (1-3) I, II, III, IV.**

Fung

Clinical experience—3 to 9 hours. Prerequisite: first- and second-year medical students with good academic standing; consent of instructor. Observation of applied anatomy, physiology, and pharmacology; role of the anesthesiologists in the operating room as part of surgical team; preanesthetic and postanesthetic evaluation of patients. May be limited opportunity to be involved in procedures. (S/U grading only.)

**490. Resident Seminar (1) I, II, III, IV.** The Staff (Eisele in charge)

Lecture—1 hour. Prerequisite: degree in medicine or veterinary medicine or consent of instructor. Series of lectures covering a spectrum of anesthesia and related topics in depth, primarily clinically oriented but also including relevant research material. Presented by faculty, residents, and visiting professors. Pertinent reference lists are circulated in advance of seminars.

**498. Individual or Group Study (1-5) I, II, III, IV.**

Eisele and staff

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.

**499. Anesthesiology Research (4-18) I, II, III, IV.**

Gronert and staff

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. (S/U grading only for medical students.)

## Biological Chemistry

### Lower Division Course

**92. Internship in Biological Chemistry (1-12) I, II, III, IV.** The Staff (Bradbury in charge)

Work-learn experience—3-36 hours; final report. Supervised work-study experience in biological chemistry and related fields. (P/NP grading only.)

### Upper Division Courses

**192. Internship in Biological Chemistry (1-12) I, II, III, IV.** The Staff (Bradbury in charge)

Work-learn experience—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to internship by preceptor. Supervised work-study experience in Biological Chemistry and related fields. (P/NP grading only.)

**198. Group Study (1-5) I, II, III, IV.** The Staff

Prerequisite: consent of instructor. For undergradu-

ate 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) I, II, III, IV.** The Staff (Bradbury in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

**\*209. Biological Significance of Prostaglandins and Related Lipids (2) II.** Ziboh (Dermatology)

Lecture—2 hours. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 101A-101B or Physiology 100A-100B or the equivalent. Isolation, quantitative estimations and biochemistry of prostaglandins, thromboxanes, prostacyclin and leukotrienes; biosynthesis from precursor fatty acids, metabolism and pathway inhibitions; nutritional effects on formation; physiological and pathophysiological functions in organ systems; present status and therapeutic promise. Offered in even-numbered years.

**214. Contemporary Medical Biochemistry (1) II.**

The Staff

Discussion—1 hour. Prerequisite: course in biochemistry or the equivalent. Series of lectures on current topics of biochemistry related to medicine. Material covered stresses concepts derived from biochemical research which have some potential clinical relevance, and are intended to be of interest to medical students. (S/U grading only.) (Same course as 414.)

**216. Protein Structure (3) II.** Benisek

Lecture—3 hours. Prerequisite: Biochemistry 201A or consent of instructor. Course designed to acquaint students at graduate level with currently applied techniques employed in determination of protein structure and significant results derived from them. Techniques which will be presented include amino acid sequence analysis, three-dimensional structure determination by X-ray diffraction, and nuclear magnetic resonance spectroscopy. Offered in odd-numbered years. (S/U grading only.)

**217. Molecular Genetics of Fungi (3) II.** Holland

Lecture—3 hours. Prerequisite: graduate standing in a biological science; Biochemistry 101B; Genetics 100, 102A; Botany 119; Plant Pathology 130, 215; 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. (Same course as Plant Pathology 217.)

**222. Mechanisms of Translational Control (2) II.**

Hershey

Lecture—1 hour; discussion—1 hour. Prerequisite: Biochemistry 201C or consent of instructor. Molecular mechanisms of protein synthesis and translational control in eucaryotic 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 even-numbered years.

**291. Topics in Cellular Biochemistry and Physiology (2) II.** Traut, Sillman (Animal Physiology)

Seminar—2 hours. Prerequisite: one course in biochemistry; Physiology 100A or Zoology 121A or 121B. General physiology, cell biology and molecular biology of living systems, with emphasis on cell form and function. One topic, representing a timely and important area of research, will serve as the focus throughout the course. May be repeated for credit. (Same course as Physiology 291C.)

**298. Group Study (1-5) I, II, III, IV.** The Staff (Bradbury in charge)

Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

**299. Research (1-12) I, II, III, IV.** The Staff (Bradbury in charge)

Prerequisite: consent of instructor. (S/U grading only.)

### Professional Courses

**410A. Molecular and Cell Biology (4.5) I.** Mathews, Holland

Lecture—5 hours. Basic biochemistry of proteins and nucleic acids is presented, followed by molecular genetics, regulation of gene expression, enzymes and structural proteins. Applications to clinically relevant systems are emphasized, particularly sickle cell anemia, thalassemias, immunoglobulins and monoclonal antibodies, oncogenes, cell proliferation control.

**410B. Cell Biology and Metabolism (3.5) II.** Traut

Lecture—4 hours (for 9 weeks). Prerequisite: approval by Committee on Student Evaluation and Promotion. Introduction to transport of small molecules and ions across membranes is followed by study of energy metabolism and biosynthetic processes in humans. Membrane receptors are considered as they relate to basic metabolic processes. Correlations to human disease are made throughout.

**414. Contemporary Medical Biochemistry (1) II.**

The Staff

Discussion—1 hour. Prerequisite: course in biochemistry or the equivalent. Series of lectures on current topics of biochemistry related to medicine. Material covered stresses concepts derived from biochemical research which have some potential clinical relevance, and are intended to be of interest to medical students. (S/U grading only.) (Same course as 214.)

**418. Mammalian Endocrinology and Homeostasis (4.5) III.** Walsh and staff

Lecture—4 hours; discussion—1 hour; student presentation. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiological and biochemical properties of the mammalian endocrine system both at the cellular and systemic level. Principles that regulate homeostasis, especially in organ-organ interrelationships, metabolites, and minerals. Reproductive endocrinology. (Same course as Human Physiology 418.)

**419. Introduction to Clinical Nutrition (3) IV.** Halsted (Internal Medicine), Rucker, and staff

Lecture—30 hours total. Prerequisite: completion of first year of School of Medicine; consent by Committee on Student Evaluation and Promotion. Integrates basic concepts of human nutrition-dietary allowances; energy, protein, vitamin and mineral requirements, and metabolism—with current knowledge of the role of nutrition in diseases—obesity, alcoholism, lipidemias, intestinal disorders, aging. (Same course as Internal Medicine 419.)

**497T. Tutoring in Biological Chemistry (1-5) I, II, III, IV.** The Staff

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. (S/U grading only.)

**498. Group Study (1-5) I, II, III, IV.** The Staff (Chairperson in charge)

Prerequisite: medical students with consent of instructor. (S/U grading only.)

**499. Research (1-12) I, II, III, IV.** The Staff (Chairperson in charge)

Prerequisite: medical students with consent of instructor. (S/U grading only.)

## Clinical Psychology

### Graduate Course

**299. Research (1-12) I, II, III, IV.** The Staff

Prerequisite: graduate student in Clinical Psychology or consent of instructor. Individual or group research on selected topics. (S/U grading only.)

## Community Health

### Upper Division Courses

**101. Perspectives in Community Health (3) I, III.**

Orgren

Lecture—2 hours; discussion—1 hour. Prerequisite: undergraduate standing. Covers comprehensively

the responsibilities, obligations, roles and professional activities of various health care disciplines in the community; provides students with perspectives on preventive medicine in society.

**180. Health Education** (1-5) I, II, III, IV. The Staff (Student Health Center)

Lecture—1-3 hours; laboratory—3-15 hours. Prerequisite: consent of instructor. Preparation for field work in the area of health education. Planning and presentation of programs on health issues. Peer counseling in the areas of sexuality and alcohol/drug abuse. (P/NP grading only.)

**180. Aging and Health** (3) III. Orgren

Lecture—3 hours. Prerequisite: upper division standing and consent of instructor. Emphasis on nature and determinants of health in the elderly. Current social and personal strategies for enhancing and maintaining health in old age.

**192. Internship in Community Health Practice** (1-5) I, II, III, IV. The Staff

Externship—3-15 hours; field supervision evaluation; written progress report. Prerequisite: open to all senior and graduate students, and consent of instructor. The totality of community health practice is observed and compared to the concepts and theory seen in didactic instruction in this field-oriented course. (P/NP grading only.)

**194. Practicum in Community Health Clinics** (1-5) I, II, III, IV. Kumagai and staff

Clinic session—3-15 hours; written report. Prerequisite: upper division student standing. The undergraduate student, through active participation in the medical aspects of community health clinics, gains knowledge of their organization, administration, and problem solving capabilities of these primary care facilities. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III, IV. The Staff (Borhani in charge)

Discussion-seminar—1-5 hours; occasional visiting lecturer. Prerequisite: senior standing and consent of instructor. Directed group study on selected topics relating to community health. (P/NP grading only.)

**199. Special Studies in Community Health** (1-5) I, II, III, IV. The Staff (Borhani in charge)

Prerequisite: advanced undergraduate standing and consent of instructor. Directed individual study on selected topics relating to community health. (P/NP grading only.)

**Graduate Courses**

**226. Psychiatric Implications of Legal Intervention** (2) I, III. Bauer

Discussion—2 hours. Prerequisite: consent of instructor. The influence of laws on human behavior, and vice versa, will be explored. Particular emphasis on youth and juvenile court procedure. (S/U grading only.) (Same course as Psychiatry 226.)

**294. Practicum in Community Health Clinics** (1-5) I, II, III, IV. Kumagai

Clinic sessions—3-15 hours. Prerequisite: open to all first- or second-year medical students, or graduate students with consent of instructor. Students are assigned to clinical settings which demonstrate ethnic, urban/rural or other related aspects of clinical community health. The students, through active participation in health care delivery, are able to relate conceptual with practical aspects of primary health care. (S/U grading only for graduate students.)

**298. Group Study in Community Health** (1-5) I, II, III, IV. The Staff

Prerequisite: medical, graduate, or veterinary students, or consent of instructor. Directed readings, discussions or community investigations in issues or problems in community health. (S/U grading only for graduate students.)

**299. Research in Community Health** (1-12) I, II, III, IV. Borhani, Weiler, Tupper, Bauer

Prerequisite: medical, graduate, or veterinary students, or consent of instructor. Directed population and community-based research in selected topics in community health. (S/U grading only for graduate students.)

**Professional Courses**

**407. Foundations of Community Health I: Principles of Preventive Medicine, Epidemiology, and Biometry** (2) II. Weiler

Lecture—2 hours. Prerequisite: consent by Committee on Student Evaluation and Promotion. Lectures and problem-oriented discussions on chronic and infectious disease models, emphasis on principles of prevention, epidemiology and biometry.

**408. Foundations of Community Health II: Preventive Medicine, Environmental Health, and Health Care Delivery** (1.5) III. Tupper and staff

Lecture—12 hours total; discussion—8 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Nature and control of environmentally dependent mortality/morbidity in various community/occupational settings and the nature, organization, financing and delivery of health care services, and how these affect disease prevention and quality of health care.

**455. Multidisciplinary Clinical Preceptorship** (4 1/2) IV. Orgren

Clinical experience—full time (3 weeks). Prerequisite: second-year student in good academic standing. Students will be introduced to basic principles of geriatric health care and provided with opportunities for clinical observation and experience in a variety of facilities that serve older adults. Multidisciplinary nature of geriatrics will be emphasized. (S/U grading only.)

**460. Geriatrics in Community Health** (6-12) I, II, III, IV. Weiler

Discussion—4 hours; clinical activity—full time (4-8 weeks) clinical setting and community needs assessment. Prerequisite: fourth-year medical student. Opportunity to participate in state-of-the-art geriatric programs ranging from well elderly to severely infirm. Sites include Yolo, Sacramento, and Martinez counties.

**461. Group Practice in Community Health** (6-18) I, II, III, IV. Borhani

Prerequisite: third- or fourth-year medical students. Clinical preceptorships in ten-man private rural group practice. Southern Monterey County Medical Group, King City, California. Group demonstrates "one door" medical care for private and indigent farm labor families. (HEW Grant.)

**465. Community Analysis and Public Health Practice Preceptorship** (6) I, II, III, IV. Weiler

Discussion—4 hours; preceptorship—full time (4 weeks) community work data analysis and public health. Prerequisite: fourth-year medical students. Provides wide variety of practical training in epidemiology, health needs of underserved, control of communicable disease and toxics, and research.

**468. Health Care Delivery in the Emergency Service** (5-18) I, II, III, IV. Borhani, Smilkenstein

Prerequisite: third- or fourth-year medical student. Student participation under faculty supervision in assessment of EMS needs through survey procedures, inventory of alternative resources and evaluation of EMS delivery systems. Course offered jointly with Department of Family Practice.

**480. Insights in Community Health** (1-3) I, II, III, IV. Weiler

Clinical experience—3-9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Introduction to concepts involved in clinical practice of geriatrics. Participation in multi-disciplinary team conferences and teaching conferences, nursing home rounds, home health visits and hospice care, as well as other geriatric services. (S/U grading only.)

**Dermatology**

**Upper Division Courses**

**192. Internship in Cutaneous Biology** (1-4) I, II, III, IV. Isseroff

Work-learn experience—8-20 hours; final report. Prerequisite: upper division standing or consent of instructor. Approval of project prior to internship by preceptor. Supervised work-learn experience involving research on the skin. (P/NP grading only.)

**199. Special Study in Cutaneous Biology** (1-4) I, II, III, IV. The Staff (Isseroff in charge)

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.)

**Graduate Course**

**299. Research in Cutaneous Biology** (1-12) I, II, III, IV. The Staff (Isseroff in charge)

Laboratory—3-36 hours. Prerequisite: consent of instructor. Independent research in cellular and biochemical mechanisms of cutaneous biology and pathology. (S/U grading only.)

**Professional Courses**

**420. Integumentary System** (2) II. Huntley and staff

Lecture—20 hours, discussion-laboratory—5 hours (25 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. The anatomical and functional relationship of the integument to the entirety of human organism discussed and demonstrated. Additionally, a morphologic approach based on lesion appearance to clinical dermatology.

**460. Dermatology Clinical Clerkship** (1-18) I, II, III, IV. Isseroff

Inpatient-outpatient service—40 hours (clinical activity). Prerequisite: completion of three years of medical school; consent of instructor. Observation of practicing dermatologist in daily work with patients and participation in Ward Rounds and Dermatology Clinics at UCD Medical Center, Kaiser, and private practitioner offices. Limited enrollment.

**480. Insights in Dermatology** (1-3) I, II, III, IV. Wheelard

Clinical experience—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. (S/U grading only.)

**498. Special Topics in Clinical Dermatology** (1-6) I, II, III, IV. The Staff (Wheelard in charge)

To be arranged—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.

**499. Research in Cutaneous Biology** (1-12) I, II, III, IV. The Staff (Isseroff in charge)

Laboratory—3-36 hours. Prerequisite: consent of instructor. Research, either laboratory or clinical, on ongoing projects within the department under supervision of faculty. (S/U grading only.)

**Family Practice**

**Lower Division Courses**

**92B. Health Science Hospital Practicum** (3-5) I, II, III, IV. Smith

Field work—in hospital setting. Prerequisite: interest in health-care delivery and consent of instructor. Field experience course for lower division students. Emphasizes observation of and providing assistance to health professionals including physicians, nurses, therapists, technicians and administrative staff. Introduces many common hospital procedures and current health issues. Students complete CPR certificate. (P/NP grading only.)

**92C. Health Science Clinic Practicum** (2) I, II, III, IV.

Field work—in clinic setting. Prerequisite: consent of instructor. Field experience to expose lower division students to health-care delivery including: patient histories and physical examinations; health promotion and disease prevention; diagnosis and treatment of episodic, acute and chronic illness; basic laboratory testing; and appropriate referral and follow-up. (P/NP grading only.)

**Upper Division Courses****192A. Internship in Family Practice** (1-12) I, II, III, IV. Davidson

Work-learn experience—3–36 hours. Prerequisite: upper division standing and consent of instructor. Work-learn experience supervised in the Department of Family Practice. Upper-division students provided an opportunity to acquire research experience in a clinical laboratory setting. (P/NP grading only.)

**192B. Health Science Hospital Practicum** (3 or 5) I, II, III, IV. Smith (Student Health Center)

Fieldwork—in hospital setting. Prerequisite: interest in health-care delivery; upper-division standing and consent of instructor. Field experience for upper-division students. Emphasizes observation of and providing assistance to health professionals including physicians, nurses, therapists, technicians and administrative staff. Introduced to many common hospital procedures and current health issues. Students complete CPR certificate. (P/NP grading only.)

**192C. Health Science Clinic Practicum** (2) I, II, III, IV. Arevalo

Field work—in clinic setting. Prerequisite: upper-division standing and consent of instructor. Field experience to introduce upper-division students to health-care delivery including: patient histories and physical examinations; health promotion and disease prevention; diagnosis and treatment of episodic, acute and chronic illness; basic laboratory testing; and appropriate referral and follow-up. (P/NP grading only.)

**195. Health Care to Underserved Populations** (1) II. Nesbitt

Lecture—1 hour. Prerequisite: sociology, political science, or applied behavioral science background recommended, or registration in medical school. Discusses socio/cultural perspectives of underserved population 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. (P/NP grading only.)

**Professional Courses**

*The following courses are for students enrolled in the Family Nurse Practitioner/Physician Assistant Program.*

**340A-340B-340C-340D. Clinical Preceptorship for FNP/PAs** (2-6) I-II-III-IV. Treguboff and staff

Clinical experience—10–30 hours. Prerequisite: registered student in Family Nurse Practitioner/ Physician Assistant Program. Student spends 10–30 hours per week with an approved physician preceptor in patient care to develop clinical skills necessary to assess and manage patients with common medical problems seen in primary care and long term care facilities.

**341A-341B-341C-341D. Advanced Clinical Preceptorship for FNP/PA Students** (3-8) I-II-III-IV. Treguboff and staff

Clinical experience—15–40 hours. Prerequisite: registered student in Family Nurse Practitioner/ Physician Assistant Program; course 340A-340B-340C-340D. Student spends 15 to 40 hours per week in an approved clinical setting to build on clinical skills in primary care learned in course 340A-340B-340C-340D. Assessment and management of patients with complex and multiple problems.

**343A-343B-343C. Inpatient Clinical Experience for FNP/PA Students** (3-3-3) I, II, III, IV. The Staff

Clinical—50 hours. Prerequisite: registered student in Family Nurse Practitioner/Physicians Assistant Program; successful completion of course 340A-340B-340C; or consent of instructor. Student clerkship in the inpatient setting in Family Practice, Surgery, and medical/surgical subspecialty electives in UCDMC and/or affiliated institutions. Designed to expose the FNP/PA program student to inpatient management; acquaint student with FNP/PA role in inpatient setting. (P/NP grading only.)

**345. Clinical Geriatrics** (3) III. Higby

Clinic—9 hours. Prerequisite: registered student in

Family Nurse Practitioner/Physicians Assistant Program. Application of principles of geriatric care to elderly patients in nursing homes, hospice, and other clinical settings.

**350. Ethics and Trends in Health Care for FNP/PAs** (2) III. Trolinger

Lecture-discussion—2 hours. Prerequisite: registered student in the Family Nurse Practitioner/ Physician Assistant Program. Trends and ethical issues in health care, review of the process and policies for ethical decisionmaking in patient care. These issues, trends, and processes will be related to the role of the Family Nurse Practitioner/Physician Assistant.

**352A-352B-352C. Professional Development of the Physician Assistant** (1-1-1) I-II-III. Treguboff and staff

Lecture-discussion—1 hour. Prerequisite: registered student in Physician Assistant Program. Study of role of the physician assistant and its historical evolution, of the organizational responsibilities and legal considerations of the physician assistant.

**354A-354B-354C. Fundamentals of Primary Health Care for FNP/PA Students** (6-4-4) I, II, III. Treguboff and staff

Lecture-discussion—4–6 hours. Prerequisite: registered student in Family Nurse Practitioner/Physician Assistant Program. Study of anatomy and physiology, pathophysiology, diagnostic criteria, approaches to assess and manage common medical problems seen in primary health care.

**355A-355B-355C. Advanced Principles of Health Care for FNP/PA Students** (4-4-4) I-II-III. Treguboff and staff

Lecture-discussion—4 hours. Prerequisite: registered student in the Family Nurse Practitioner/ Physician Assistant Program; course 354A-354B-354C. Study of anatomy and physiology, pathophysiology, diagnostic criteria and approaches to assess and manage patients with complex and/or multiple health care problems in primary care settings, and to learn the management of patients in inpatient settings.

**356. Pharmacology for FNP/PA Students** (4) I-II-III. Treguboff and staff

Lecture-discussion—4 hours. Prerequisite: registered student in the Family Nurse Practitioner/ Physicians Assistant Program. Principles of pharmacokinetics and pharmacodynamics, the classifications of drugs and representative drugs within each class, and application of these principles to pediatric and geriatric patients, and to pregnant or lactating women.

**360A-360B-360C. Ethics and Trends in Health Care for FNP Students** (1-1-1) I-II-III. Treguboff and staff

Lecture-discussion—1 hour. Prerequisite: registered student in the Family Nurse Practitioner Program or consent of instructor. The student will learn about trends and ethics in health care, and review process and policies for ethical decision-making in patient care. These issues, trends and processes will be related to the role of the Family Nurse Practitioner.

**362A-362B-362C. Professional Development of the FNP** (1-1-1) I-II-III. Treguboff and staff

Lecture-discussion—1 hours. Prerequisite: registered student in the Family Nurse Practitioner Program or consent of instructor. Study of the role of the nurse practitioner and its historical evolution, of the legal considerations, of the implications of case management and advocacy for the consumer, and of professional responsibilities of the Family Nurse Practitioner.

**364A-364B-364C. Behavioral Science for FNP/PA Students** (2-3-1) I-II-III. Treguboff and staff

Lecture-discussion—1-3 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physicians Assistant Program. Study of communication skills and interviewing techniques, of self-awareness and awareness of others, of assessment of patients' concerns and counseling skills to help them gain insight and reach their own solutions, of behavior modification concepts and techniques.

**364D-364E-364F. Behavioral Science for FNP/PA Students** (1-1-1) I-II-III. Treguboff and staff

Lecture-discussion—1 hour. Prerequisite: registered student in the Family Nurse Practitioner/Physician Assistant Program; successful completion of course 364A-364B-364C or consent of instructor. Continuation of courses 364A-364B-364C.

**366A-366B-366C-366D. Family Practice and Community Health for FNP/PA Students** (2-2-2) I-II-III-IV. Treguboff and staff

Lecture-discussion—2 hours. Prerequisite: registered student in the Family Nurse Practitioner/Physicians Assistant Program. Study of family dynamics, growth and development, health care in all age groups including special concerns in pediatrics and geriatrics, health promotion and disease prevention, and cultural and community needs and concerns.

**399. Special Study for Advanced Undergraduates** (1-5) I, II, III, IV. Davidson

Prerequisite: consent of instructor. Flexibility to develop and pursue research and clinical interests to enhance education in Family Practice. (P/NP grading only.)

**Professional Courses****400A-400B-400C. Introduction to Patient Evaluation** (2-2-2) I, II, III. Arevalo

Lecture-discussion—18 hours total; clinic—6 hours total; conference or laboratory—4–8 hours total. Using a problem-based format and simulated patients each student will practice dealing with communication problems and learn basic physical examination skills through small group interactions. A continuity preceptorship and introduction to emergency medicine will also be offered. (Deferred grading only, pending completion of sequence.)

**401. Preceptorship in Family Practice** (1-9) I, II, III, IV. Morgan

Preceptorship—part-time (one 4-hour day per week; 10 weeks) or full-time (40-hour week per 1.5 units; 4 to 6 weeks). Prerequisite: medical students with consent of instructor. Student preceptorship in family physician's office as an introduction to clinical medicine.

**\*402. Introductory Medical Spanish** (1) III. David-son

Discussion—2 hours. Prerequisite: restricted to medical students in good academic standing. Students learn vocabulary needed to conduct a basic medical history and physical in Spanish. (S/U grading only.)

**407. Davis Community Clinic** (2) I, II, III, IV. Tanji

Clinic—5–6 hours. Prerequisite: second-year medical student in good academic standing. Students learn to diagnose and treat common medical problems as seen at a community clinic, under the direct supervision of a physician. (S/U grading only.)

**434A-434B-434C-434D-434E-434F-434G-434H. Primary Care at Clinica Tepati** (3-3-3-3-3-3-3) I-II-III-IV-I-II-III-IV. Arevalo

Clinic—four 8-hour days; group seminar/discussion—ten 1-hour sessions; training session/lecture—four 2-hour sessions. Prerequisite: first- and second-year (full-time) medical students with consent of instructor; pre-application processed. Exposure to episodic and acute disease; learn physical examination and taking a complete history; also learn immunization techniques, use of laboratory tests. Limited enrollment. (S/U grading only.)

**435A-435B-435C-435D-435E-435F-435G-435H. Primary Care at Clinica Tepati** (3-3-3-3-3-3-3) I-II-III-IV-I-II-III-IV. Arevalo

Clinic—four 8-hour days; group seminar/discussion—ten 1-hour sessions; training session/lecture—four 2-hour sessions. Prerequisite: third- and fourth-year (full-time) medical students with consent of instructor; pre-application processed. Counseling, diagnosis, and treatment of patients with chronic (long-term) and acute (short-term) disease under supervision of a physician; as well, exposure to other special health-care needs of ethnic groups, and poor people in general. (S/U grading only.)

**440. Ambulatory Medicine Clerkship** (6 or 12) I, II, III, IV. Scherger, Nesbitt

Clinical clerkship—full time (4 or 8 weeks). Prerequisite: third-year medicine clerkship. Ambulatory

medicine experience in family practice setting. Acquisition of skills to evaluate and develop a treatment plan for patients with common medical problems seen by primary care physicians in the outpatient setting.

**445. Sports Medicine from a Primary Care Perspective** (6) I, II, III, IV. Tanji

Clinic—full time (4 weeks). Prerequisite: fourth-year medical student in good academic standing. Students spend full time in outpatient clinic settings in family practice, orthopaedic surgery, physical education, internal medicine, and a community private practice. Students learn principles and practice of sports medicine from a primary care perspective.

**462. Family Practice Preceptorship** (3-18) I, II, III, IV. Scherger

Clinic—full time (3 days per unit). Prerequisite: completion of third year of medical school or medical student with consent of instructor. Preceptorships with primary care physicians in a variety of settings. Involvement in direct patient care and daily activities under supervision of physician-preceptor.

**463. Selected Readings in Family Practice** (1-9) I, II, III, IV. The Staff

Discussion—3-27 hours. Prerequisite: medical students in good academic standing. Increase understanding of family practice through assigned reading and thorough discussion with faculty member.

**468. Family Practice in a Foreign Culture** (6-18) I, II, III, IV. Arevalo

Clinic. Prerequisite: completion of third year in medical school. Visit a family practitioner in a foreign country (arranged in advance by Department), accompany and participate in clinic activities of preceptor and analyze and report characteristics of the practice.

**469. Family Practice Clerkship** (3-18) I, II, III, IV. Nesbitt

Clinic—full-time. Prerequisite: third- and fourth-year medical students with consent of instructor (third-year students may elect to enroll for second half of spring quarter). Involvement in comprehensive primary medical care of patients in a family setting and observe the team approach to health care.

**480. Insights in Family Practice** (1-3) I, II, III, IV. Morgan, Scherger

Clinic—3 to 9 hours; required readings. Prerequisite: first, and second-year medical students in good academic standing; consent of instructor. Exposure to family practice in outpatient clinical setting. Three to nine hours per week spent with a community physician preceptor who is a member of the clinical faculty. (S/U grading only.)

**488. Directed Group Study in Family Practice** (1-9) I, II, III, IV. The Staff

Discussion—3-37 hours. Prerequisite: medical students with consent of instructor. Directed study on selected topics relating to family medicine and primary health care delivery; visits to and written analysis of selected innovative health care programs. (S/U grading only.)

**499. Research** (1-12) I, II, III, IV. The Staff

Prerequisite: medical students with consent of instructor. Research in various aspects of the health care delivery system. (S/U grading only.)

## Human Anatomy

### Upper Division Courses

**101. The Gross and Microscopic Structure of the Human Body** (4) II. Patterson

Lecture—4 hours. Prerequisite: Biological Sciences 1A or 10; Physiology 2-2L or Biological Sciences 1B recommended. A study of the gross and microscopic structure of the human body with emphasis on function.

**101L. The Gross and Microscopic Structure of the Human Body** (2) II. Patterson

Laboratory—two 3-hour sessions. Prerequisite: course 101 (may be taken concurrently). Laboratory will be taught from prosections, models and slides to give students the opportunity to learn structure from direct experience.

**192. Internship in Morphology** (1-12) I, II, III, IV. The Staff

Work-learn experience—3-36 hours; final report. Prerequisite: upper division standing; laboratory science experience including some chemistry; approval of project by preceptor prior to period of work learn. Experience of supervised work study in research laboratories of members of the Department. (P/NP grading only.)

**197T. Tutoring in Human Anatomy** (3-5) II. The Staff

Discussion—1 hour; laboratory—6-9 hours. Prerequisite: completion of course 101 with a grade of B or better. 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) I, II, III, IV. The Staff (Chairperson in charge)

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) I, II, III, IV. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

**200. Gross Anatomy** (8) I. Patterson

Lecture—3 1/2 hours; discussion—1 hour; laboratory—10 1/2 hours. Prerequisite: graduate student status and consent of instructor. To provide students with a vocabulary of human body structure and to acquaint them with structural relationships through dissection and lecture and to introduce them to functional aspects of gross anatomy, particularly as regards anatomical problem solving.

**201. Human Embryology** (2) I. Hendrickx

Lecture—2 hours. Prerequisite: graduate student status and consent of instructor. Developmental anatomy of the human from fertilization to parturition including the origin of basic form of the embryo, development of the organ systems, and nature of anomalous development.

**202. Human Microscopic Anatomy** (5) II. Meizel

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.

**203. Neurosciences** (6) III. Vijayan

Lecture—5 hours; laboratory—3 hours. Prerequisite: consent of instructor. Gross and microscopic anatomy of the central nervous system; motor and sensory pathways; neurophysiology, and cognitive functions.

**\*205. Cell Biology of Mammalian Gametes and Fertilization** (2) III. Meizel

Seminar—2 hours. Prerequisite: lecture courses in biochemistry and cell biology; consent of instructor. Presentation and discussion by students of selected research areas concerned with the cell biology of mammalian fertilization. Emphasis on mechanisms involved in gamete maturation, ovulation, sperm capacitation, acrosome reaction, gamete binding, gamete fusion, block to polyspermy, and pronuclear formation. Offered in odd-numbered years.

**290. Seminar** (1) I, III. The Staff

Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)

**290C. Research Group Conference** (1) I, II, III. The Staff

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.)

**292. Fertilization and Gamete Literature Critique**

(1) I, II, III. Meizel

Seminar—1 hour. Prerequisite: a course in cell biology and in biochemistry or consent of instructor. Criti-

cal evaluation of current journal articles dealing with cell biology and biochemistry of gametes and fertilization. Selected papers will be presented and discussed in detail by students and faculty. May be repeated for credit. (S/U grading only.)

**298. Advanced Group Study** (1-5) I, II, III, IV. The Staff

Prerequisite: consent of instructor.

**299. Research** (1-12) I, II, III, IV. The Staff

Prerequisite: consent of instructor. (S/U grading only.)

### Professional Courses

**400. Developmental, Gross, and Radiologic Anatomy** (9) I. Patterson and staff

Lecture—6 hours; laboratory—12 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Integrated presentation of developmental, gross, and radiologic anatomy. Four students are assigned to a cadaver and dissect the entire body. Embryology and radiology are correlated with the dissections. Embryology is covered from implantation to birth.

**402. Human Microscopic Anatomy** (5) II. Meizel and staff

Lecture—3 hours; laboratory—6 hours. Prerequisite: Approval by committee on Student Evaluation and Promotion. 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 section material at the light microscopic and ultrastructural levels.

**403. Neurobiology** (5) III. Vijayan

Lecture—4 hours; laboratory—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiology and anatomy of the normal human nervous system in an integrated format. Focus on gross and microscopic brain structure, functional neuroanatomy, and the physiology, biochemistry, and pharmacology of the nervous system. (Same course as Human Physiology 403.)

**497T. Tutoring in Human Anatomy** (1-5) I, II, III, IV. The Staff

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. (S/U grading only.)

**498. Advanced Group Study** (1-12) I, II, III, IV. The Staff

Prerequisite: medical students, interns, and residents with consent of instructor. Directed reading and group discussion and/or laboratory experience on selected topics. (S/U grading only.)

**499. Research** (1-12) I, II, III, IV. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (S/U grading only.)

## Human Physiology

### Upper Division Courses

**192. Internship in Human Physiology** (1-12) I, II, III, IV. The Staff (Renkin in charge)

Work-learn experience—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work-study experience in physiology and related fields. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III, IV. The Staff (Renkin in charge)

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) I, II, III, IV. The Staff (Renkin in charge) Laboratory—3-15 hours; undergraduate research project. Prerequisite: senior standing in biology, chemistry, physics, psychology, or engineering. (P/NP grading only.)

**Graduate Courses****200. Human Physiology** (6) II. Curry, Renkin, and staff

Lecture—50 hours total; discussion—10 hours total. Prerequisite: graduate standing and consent of instructor. General cellular and organ system physiology, including neural, cardiovascular, respiratory, gastrointestinal and urinary systems in the human. Lectures concurrent with course 400; research-discussion and laboratory-demonstration sessions, and examinations separate.

**210. Advanced General Physiology** (3) III. Curry, Cala

Lecture—3 hours. Prerequisite: Physiology 100B; Biochemistry 101B; Chemistry 107B; graduate standing and consent of instructor. Physicochemical basis of living systems with emphasis on membrane permeability characteristics at both the cellular and tissue level. Offered in even-numbered years.

**231. Renal Physiology** (3) I. Rabinowitz

Lecture—3 hours. Prerequisite: Physiology 112, 113 or the equivalent; graduate standing. Topics in mammalian renal physiology and related areas of biological transport, fluid and electrolyte homeostasis, comparative renal physiology, and pathophysiology of the kidney in man. Offered in odd-numbered years.

**250. Circulatory Transport and Fluid Exchange** (3)

I. Renkin, Kramer

Lecture—2 hours; discussion—1 hour. Prerequisite: Physiology 112-113-114 or courses 400-403-418 or the equivalent; or consent of instructor. Lectures, assigned reading and discussion of: principles of microcirculatory exchange; blood, interstitial fluid and lymph dynamics; regulation of plasma and interstitial fluid volume; disturbances of plasma and interstitial fluid exchange; fluid replacement. Offered in even-numbered years.

**260. Physiological Systems Analysis** (5) I. Smith

Lecture—4 hours; discussion—1 hour. Prerequisite: Mathematics 22B and Physiology 113; or consent of instructor. Quantitative analysis of physiological control systems; mathematical models and analytic methods appropriate for the study of different types of physiological control; application of these techniques to investigation of homeostasis. Offered in odd-numbered years.

**261. Simulation of Physiological Systems** (1-3) I, II, III, IV. Smith

Laboratory—3-9 hours. Prerequisite: course 260 or the equivalent; consent of instructor. Selected problems in simulation of physiological control systems. Simulations performed on current microcomputer hardware using high level simulation languages. Problems may be selected from literature or from student's research; experimental testing of the simulation encouraged.

**280. Pulmonary Function Evaluation** (4) I, II, III.

Siefkin, Cross

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 400 or the equivalent; consent of instructor. Clinical laboratory, physiological evaluations of pulmonary function. (Same course as 480.)

**285. Peripheral Circulation** (3) III. Gray

Lecture—1 hour; discussion—2 hours. Prerequisite: Physiology 111B, 113, or the equivalent and consent of instructor. Series of lectures and discussion sessions on the physiology of mammalian peripheral circulation including topics on: anatomy, physiology, and pharmacology of vascular smooth muscle, regional circuits, microcirculatory control mechanisms, and dynamics of capillary transport. Offered in even-numbered years.

**298. Group Study** (1-5) I, II, III, IV. The Staff (Renkin in charge)

Prerequisite: consent of instructor. For graduate students desiring to explore particular topics in depth. Lectures and conferences may be involved.

**299. Research** (1-12) I, II, III, IV. The Staff (Renkin in charge)

Prerequisite: consent of instructor. (S/U grading only.)

**Professional Courses****400. Human Physiology** (8) II. Curry, Renkin, and staff

Lecture—6 hours; laboratory—6 hours. Prerequisite: consent by Committee on Student Evaluation and Promotion. General, cellular and systemic physiology of cardiovascular, respiratory, gastrointestinal and urinary systems.

**403. Neurobiology** (5) III. Vijayan

Lecture—4 hours; laboratory—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiology and anatomy of the normal human nervous system in an integrated format. Focus on gross and microscopic brain structure, functional neuroanatomy, and the physiology, biochemistry, and pharmacology of the nervous system. (Same course as Human Anatomy 403.)

**418. Mammalian Endocrinology and Homeostasis**

(4.5) III. Walsh and staff

Lecture—4 hours; discussion—1 hour; student presentation. Prerequisite: approval by Committee on Student Evaluation and Promotion. Physiological and biochemical properties of the mammalian endocrine system both at the cellular and systemic level. Principles that regulate homeostasis, especially in organ-organ interrelationships, metabolites, and minerals. Reproductive endocrinology. (Same course as Biological Chemistry 418.)

**480. Pulmonary Function Evaluation** (4) I, II, III.

Siefkin, Cross

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 400 or the equivalent; consent of instructor. Clinical laboratory, physiological evaluations of pulmonary function. (Same course as 280.)

**497T. Tutoring in Human Physiology** (1-5) I, II, III, IV. Renkin

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. (S/U grading only.)

**498. Directed Reading and Group Study** (1-4) I, II, III, IV. Renkin and staff

Discussion—2-8 hours. Prerequisite: medical student. Directed reading and discussion on selected topics in human physiology. (S/U grading only.)

**499. Research** (1-6) I, II, III, IV. Renkin and staff

Prerequisite: medical students with consent of instructor. Laboratory investigation on selected topics. (S/U grading only.)

**Internal Medicine****Upper Division Courses****192. Internship in Internal Medicine** (1-12) I, II, III, IV. The Staff

Work-learn experience—3-36 hours; final report. Prerequisite: upper division standing. Supervised work-study experience in internal medicine and related fields. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III, IV. The Staff (Chairperson in charge)

Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

**Graduate Course****290. Topics in Molecular Medicine** (1) I, II, III, IV.

Lawrence

Discussion—1 hour. Prerequisite: graduate student standing and consent of instructor. Reading and discussion of major advances in the molecular biology aspects of medicine. Students and staff will choose and present molecular biology papers from basic research journals. Emphasis will be on new applications of recombinant DNA technology to medicine and applied basic research. (S/U grading only.)

**Professional Courses****400. Introduction to Emergency Medicine** (1.5) I.

Derlet and staff

Clinical activity—20 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion.

Basic CPR with American Heart Association certification; first aid including splinting, bandaging, control of bleeding and transportation; evaluation of the whole patient and prioritization of evaluation and treatment; mechanisms of injury; exposure to pathophysiology of specific problems.

**401A. Physical Diagnosis Practicum** (2) II. G.E. Foulke, J. Robbins

Lecture—1 hour, discussion—1 hour, and clinical activity—4 hours (30 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Students spend 6 days at one of the University or affiliated hospitals or in office of a medical faculty person, learning and practicing clinical skills. Additional time will be in a preceptorship, course 401B. (Deferred grading only, pending completion of course sequence.)

**401B. Physical Diagnosis Practicum** (1) III. G.E. Foulke, J. Robbins

Individual study—1 hour; clinical practicum—six 3-hour sessions. Prerequisite: consent by Committee on Student Evaluation and Promotion. School of Medicine faculty members will supervise, as preceptors, one or two students each session. They will meet at least six times with a suitable patient for students to develop individual clinical skills. (Deferred grading only, pending completion of course sequence.)

**402. Occupational Medicine** (1) II. Schenker

Lecture—1 hour. Prerequisite: consent by Committee on Student Evaluation and Promotion. Introduction to principles of occupational medicine. Diagnosing disease due to occupational exposure, occupational diseases of the lungs, skin, nervous and reproductive systems, cancer of occupational origin. Occupational epidemiology and legal/legislative aspects of occupational medicine discussed.

**419. Introduction to Clinical Nutrition** (3) IV. Halsted, Phinney, McCamish, and staff

Lecture—30 hours total. Prerequisite: completion of first year of School of Medicine; consent by Committee on Student Evaluation and Promotion. Integrates basic concepts of human nutrition-dietary allowances; energy, protein, vitamin and mineral requirements, and metabolism—with current knowledge of the role of nutrition in diseases—obesity, alcoholism, lipidemias, intestinal disorders, aging. (Same course as Biological Chemistry 419.)

**420A. Hematopoietic and Lymphoreticular System** (4.5) I. Lewis, DeNardo and Staff

Lecture—21 hours; laboratory—23 hours; discussion—20 hours (64 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Provides a solid foundation in basic and diagnostic hematology with lesser emphasis on details of blood disease management. Introduction to radiation as it affects patients and society and the use of radionuclides in medicine.

**420B. Pathophysiologic of Digestive Diseases: Gastrointestinal System** (3.5) I. Pimstone and staff

Lecture—31 hours; discussion—9 hours (40 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Basic emphasis on pathophysiologic basis of gastroenterological and hepatic disorders. Case discussions and symposia held primarily to exemplify basic principles covered by lectures.

**420C. Respiratory System: Pathophysiology of Respiratory System** (4) II. Lillington and staff

Lecture—38 hours; discussion—14 hours (52 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Foundation of integrative pathophysiology of the human respiratory system.

**420D. Principles of Cardiovascular Medicine** (4) II. Laslett and staff

Lecture—3 hours; discussion—2 hours. Prerequisite: consent by Committee on Student Evaluation and Promotion. Introduction to principles of diagnosis and management of cardiovascular disorders.

**420E. Urinary System** (3.5) III. Gulyassy and staff

Lecture—24 hours; discussion—18 hours; laboratory—10 hours (52 hours total). Prerequisite: consent

by Committee on Student Evaluation and Promotion. Fundamental aspects of (a) disorders of body water, electrolytes and acid/base balance; (b) major categories and mechanisms of parenchymal renal diseases; (c) major congenital and acquired urologic diseases; (d) urinary tract infections. (Same course as Urology 420.)

**420F. Endocrine Metabolic-Regulatory** (4.5) III.

Soldner and staff

Lecture—38 hours; discussion—14 hours (52 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Basic understanding of pathophysiological processes in organs and tissues primarily involved in metabolic regulation and sufficient factual base so that clinical and laboratory findings, diagnosis and elementary management of patients with endocrinological disorders can be rationalized.

**440. Ambulatory Medicine Clerkship** (6 or 12) I, II, III, IV. Fitzgerald

Clinical experience—full time (4 or 8 weeks). Prerequisite: third-year medicine clerkship. Four- or eight-week ambulatory medicine experience in an internal medicine setting. Acquisition of skills to evaluate and develop a treatment plan for patients with common medical problems seen by primary care physicians in the outpatient setting.

**461. Problems in Internal Medicine** (6 or 9) I, II, III, IV. Wong

Clinical activity—full time (4 or 6 weeks). Prerequisite: satisfactory completion of third year of medical school; consent of instructor. Study of inpatients hospitalized on Medical Service. Experience in Internal Medicine at Woodland Clinic and Hospital. Daily rounds, mornings with instructor, Monday through Friday; afternoons patient assignments. Teaching conferences and combined radiology-pathology medicine seminars. Weekly allied specialty conference.

**462. Externship in Medicine** (1-21) I, II, III, IV.

Fitzgerald and staff

Externship—full time (4, 8, or 12 weeks). Prerequisite: Medical Sciences 431; demonstrated ability to accept responsibility; consent of instructor. Student assumes role of acting intern and will be primary physician on medical ward under direction of medical resident and staff. Responsibility for patients admitted to acting intern and take call every fourth-night. Also taken at Children's S.F. Hospital. Limited enrollment.

**463. Acting Internship in Medicine Intensive Care**

**Unit (MICU)** (9) I, II, III, IV. Albertson

Clinical activity—full time. Prerequisite: completion of third year in medical school; consent of Director of MICU. At UCD Medical Center, 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 third night. Limited enrollment.

**\*465. Internal Medicine and Subspecialties in Out-patient Clinic: VA Outpatient Clinic** (6-18) I, II, III, IV. Grecu and staff

Clinical activity—full time (4 or 12 weeks); includes conference and lectures. Prerequisite: completion of third year of Medical School. Participation with members of specialty (internal medicine) and subspecialty (cardiology, gastroenterology, endocrinology, pulmonary and immunology-allergy) in the initial clinical evaluation, work-up, management and follow-up of patients in outpatient clinical setting. Limited enrollment.

**498. Group Study in Internal Medicine** (1-18) I, II, III, IV. The Staff (Silva in charge)

Prerequisite: consent of instructor. Special study for medical students which may involve laboratory or library research, ambulatory or inpatient care responsibility on campus, at UCD Medical Center or off campus by specific arrangement. (S/U grading only.)

## Internal Medicine—Cardiology

### Upper Division Course

**192. Internship in Cardiology** (1-12) I, II, III, IV.

Longhurst and staff

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in cardiology. May be repeated for credit up to 12 units. (P/NP grading only.)

### Graduate Course

**220. Basic Science in Cardiology** (1) I. Kaufman

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 even-numbered years. (S/U grading only.)

### Professional Courses

**401. Clinical Cardiology Clerkship: Kaiser** (3-18) I, II, III, IV. The Staff

Clinical clerkship (4 weeks)—8-12 hours (hospital); 1-5 hours (clinics). Prerequisite: third- and fourth-year medical students with advance approval by Division of Cardiology. 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. The roles of ECG, PCG, and cardiac fluoroscopy, etc., in office cardiology will be evaluated. May be repeated for credit. Limited enrollment.

**460. Cardiology Clinical Clerkship: Consult Service** (3-18) I, II, III, IV. The Staff

Inpatient-outpatient service (4 weeks)—full time (40 hours). Prerequisite: third- and fourth-year medical students with advance approval by Division of Cardiology. Participation with members of subspecialty consultation service in initial clinical evaluation, work-up, management, and follow-up of patients with cardiologic disorders. May be repeated for credit. Limited enrollment.

**461. Management of Coronary Artery Disease: Coronary Care Unit** (3-18) I, II, III, IV. The Staff

Inpatient service—full time (4 weeks). Prerequisite: completion of second year of medical school and advance approval by Division of Cardiology. 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 pathophysiologic mechanisms. May be repeated for credit. Limited enrollment.

**462. Cardiology Clinical Clerkship: Martinez VA Hospital** (3-18) I, II, III, IV.

Lecture—1-2 hours; discussion—8 hours; seminar—2 hours; clinical consultation—20-25 hours. Prerequisite: third- and fourth-year medical students with advance approval by Division of Cardiology, Martinez VA Hospital, and consent of instructor. Clinical evaluations in cardiology under supervision of a medical resident and attending physician. Active participation in seminars and conference. Limited enrollment.

**464. Preventive Cardiology** (6) I, II, III, IV. Amsterdam

Seminar—2 hours (4 weeks); clinic—full-time (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.

**480. Insights in Cardiology** (1-3) I, II, III, IV. The Staff

Clinical experience—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. (S/U grading only.)

**498. Special Group Study: EKG Unit** (1-12) I, II, III, IV. The Staff (Chairperson in charge)

Special study—2-week sessions. Prerequisite: medical students with advance approval by monthly attending faculty. 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. (S/U grading only.) Limited enrollment.

**499. Research** (1-12) I, II, III, IV. The Staff

Prerequisite: approval by Division of Cardiology. (S/U grading only.)

## Internal Medicine—Emergency Medicine

### Upper Division Course

**192. Internship in Emergency Medicine** (1-12) I, II, III, IV. Derlet and staff

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in emergency medicine. May be repeated for credit up to 12 units. (P/NP grading only.)

### Professional Courses

**460. Emergency Medicine Clerkship** (3-6) I, II, III, IV. Derlet and staff

Clinical experience—full time (2 to 4 weeks). Prerequisite: third or fourth year medical student; satisfactory completion of Internal Medicine or Surgery clerkship; consent of instructor. Clinical work at UCD Medical Center or other area hospitals' emergency departments will be supplemented by didactic sessions. Students will be assigned appropriate emergency patients and will examine diseases and treat those patients.

**465. Acting Internship in Emergency Medicine** (6-12) I, II, III, IV. Derlet

Clinical clerkship—full time (4 to 8 weeks). Prerequisite: satisfactory completion of course 460. Acting internship provides clinical experience in emergency medicine. Students are assigned to the regular Emergency Department intern schedule and under the supervision of the faculty, see and evaluate Emergency Room (ER) patients with responsibility similar to an intern.

**499. Research** (6-18) I, II, III, IV. Derlet

Laboratory—40 hours; research—full time (4 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.

## Internal Medicine—Endocrinology

### Upper Division Course

**192. Internship in Endocrinology** (1-12) I, II, III, IV. Walter and staff

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in endocrinology. May be repeated for credit up to 12 units. (P/NP grading only.)

### Graduate Course

**299. Research** (1-12) I, II, III, IV. The Staff (Walter in charge)

Prerequisite: consent of instructor. Endocrinology research. (S/U grading only.)

### Professional Courses

**460. Endocrinology Clinical Clerkship** (5-18) I, II, III, IV. Walter and staff

Inpatient-outpatient clinical activity—full time (3 days per unit). Prerequisite: Medical Sciences 431 and/or

consent of instructor. Participation with members of subspecialty service in the initial evaluation, work-up, management and follow-up of patients with endocrinologic disorders. Both inpatient and outpatient experience. Limited enrollment.

**465. Endocrinology Clinical Clerkship (9 or 18) I, II, III, IV. Noth**

Lecture-discussion-seminar; clinical consultation—20-25 hours. Prerequisite: fourth-year medical students with consent of instructor. Clinical consultations in endocrinology at Martinez VA Hospital under supervision of medical resident and attending physician. Participation in seminars and conferences.

**480. Insights in Endocrinology (1-3) I, II, III, IV.**

Walter

Clinical experience—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. (S/U grading only).

**499. Research (1-12) I, II, III, IV. The Staff (Walter in charge)**

Prerequisite: consent of instructor.

## Internal Medicine—Gastroenterology

### Upper Division Course

**192. Internship in Gastroenterology (1-12) I, II, III, IV. Trudeau and staff**

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in gastroenterology. May be repeated for credit up to 12 units. (P/NP grading only.)

### Professional Courses

**460. Clinical Clerkship (3-18) I, II, III, IV. Pimstone and staff**

Clinical rotation—full time (2 to 12 weeks). 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.

**462. Gastroenterology Clinical Clerkship (1-18) I, II, III, IV.**

Inpatient-outpatient clinical activity. Prerequisite: successful completion of third year and consent of instructor. Participation with members of subspecialty service in the initial clinical evaluation, work-up, management and follow-up of patients with gastrointestinal disorders. Offered at VA Hospital, Martinez.

**480. Insights in Gastroenterology (1-3) I, II, III, IV.**

Trudeau

Clinical experience—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 following: endoscopic procedures, ward rounds, outpatient clinic, and G.I. grand rounds. (S/U grading only.)

**499. Research (1-12) I, II, III, IV. Pimstone, Trudeau, Zeldis, Lawson, Prindville**

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. Clinical: varied. (S/U grading only.)

## Internal Medicine—General Medicine

### Upper Division Course

**192. Internship in General Medicine (1-12) I, II, III, IV. J. Robbins and staff**

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by pre-

ceptor prior to internship. Supervised work-study experience in general medicine. May be repeated for credit up to 12 units. (P/NP grading only.)

### Professional Courses

**440A-440B-440C-440D-440E-440F-440G. Introduction to AIDS and Related Disorders (2) I, II, III, IV.**

Flynn

Discussion—1 hour; clinical experience—3 hours. Prerequisite: first and second year medical students in good academic standing and permission of instructor. This course 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 life styles. (S/U grading only.)

**450. Physicians in the Nuclear Age (1) I. Flynn**

Lecture—1 hour; discussion—1/2 hour. Prerequisite: medical student in good standing, or consent of instructor. Examine actual and potential physical, medical, psychosocial, epidemiological, and economic consequences of nuclear weapons and nuclear war. (S/U grading only.) Offered in even-numbered years.

**460. General Medicine Consults (1-18) I, II, III, IV.**

The Staff (Division Chief in charge)

Inpatient-outpatient clinical activity—40 hours. Prerequisite: fourth-year medical students with consent of instructor; a general medicine clerkship. 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. Limited enrollment.

**471A-471B-471C-471D-471E-471F-471G. Clinic of AIDS and Related Disorders (2) I, II, III, IV. Flynn**

Discussion—1 hour; clinical experience—3 hours. Prerequisite: third and fourth year medical students in good academic standing and permission of instructor. Students will participate in patient care, including patient examination and the diagnosis and treatment of patients with acquired immune deficiency syndrome and AIDS related complex. Students will participate in intensive ambulatory care medicine as well as clinic research. (S/U grading only.)

**499. General Medicine Research (1-18) I, II, III, IV.**

The Staff

Discussion—3 hours; clinical research—8-40 hours. Prerequisite: consent of instructor. The 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.

## Internal Medicine—Hematology-Oncology

### Upper Division Course

**199. Research in Hematology—Oncology (1-5) I, II, III, IV. MacKenzie and staff**

Laboratory—hours variable. Prerequisite: upper division standing and consent of instructor. Experience in laboratory research. (P/NP grading only.)

### Graduate Courses

**298. Topics in Hematology (1-4) I, II, III, IV. The Staff (Lewis in charge)**

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) I, II, III, IV. The Staff (Lewis in charge)**

Prerequisite: consent of instructor. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.)

## Professional Courses

**460. Hematology-Oncology Clinical Clerkship (6-18) I, II, III, IV. J.P. Lewis and staff**

Inpatient-outpatient clinical activity—40 hours. Prerequisite: Medical Sciences 431 and/or consent of instructor. Participation with members of the subspecialty service in the initial clinical evaluation, work-up, management and follow-up of patients with hematologic or oncologic disorders. May be repeated for credit. Limited enrollment.

**461. Ambulatory and Consult Clerkship (6-12) I, II, III, IV. Lewis and staff**

Clinical experience—full time (4 to 8 weeks). Prerequisite: fourth-year medical student in good academic standing. Outpatient rotations include general hematology/oncology clinics, hemophilia clinic, sickle cell clinic, and two medical/surgical joint clinics. In addition, students will work on inpatient hematology and oncology consult service, the bone marrow service, and will attend all conferences sponsored by the Division.

**462. Hematology-Oncology Clinical Clerkship (6-18) I, II, III, IV. Gandra and staff**

Inpatient-outpatient clinical activity—40 hours. Prerequisite: Medical Sciences 431 and/or consent of instructor. Intensive clinical experience in hematology-oncology at Martinez VA Hospital, with emphasis on evaluating new patients, reading bone marrows, and administering chemotherapy. Weekly tutorial sessions with faculty and presentation of a comprehensive review of one topic. May be repeated for credit. Limited enrollment.

**490. Practicum in Care for the Terminally Ill (6) I, II, III, IV. Meyers**

Discussion—3 hours; seminar—2 hours; hospice clinical activity—full time (4 weeks duration); written report. Prerequisite: fourth-year medical student and an interview with program Medical Director. UCD Medical Center Sacramento Continuing Care Program provides supportive services to patients with terminal illness. Emphasis on outpatient care and home care. This elective provides experience in symptom relief, psycho-social care and bereavement counseling. Written report will be major component used in grading. (S/U grading only.)

**499. Research (1-12) I, II, III, IV. The Staff (Lewis in charge)**

Prerequisite: consent of instructor. (S/U grading only.)

## Internal Medicine—Infectious Diseases

### Upper Division Courses

**192. Research Internship in Internal Medicine (1-12) I, II, III, IV. Goldstein and staff**

Work-learn experience—3-36 hours; final report. Supervised work-learn 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) I, II, III, IV. The Staff (Goldstein in charge)**

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 Course

**250. Small Computers in Medical Research (3) I. Donovan**

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Theoretical principles and practical aspects of mini- and microcomputer applications in medical research.

**Professional Courses**

**400. Infectious Diseases Clinic** (4.5-6) I, II, III, IV.  
Goldstein and staff  
Clinical experience—full time (3 to 4 weeks). Ambulatory patient care training. Prerequisite: Medical Sciences 431. Selected outpatients at UC Davis Medical Center with chronic respiratory or urinary tract infections will be worked up and followed.

**460. Infectious Diseases Clinical Clerkship** (6-18) I, II, III, IV. Goldstein

Clinical experience—full time (4-12 weeks). Prerequisite: successful completion of two years of study in an accredited medical school. In addition to seeing patients ill with infectious diseases regarding whom consultation has been requested, students will have laboratory experience in clinical microbiology. Students will also attend and participate in infectious diseases conferences and rounds. Limited enrollment with priority to third-year medical students.

**465. Clinical Clerkship** (3-18) I, II, III, IV. McCabe  
Lecture—1 hour, discussion—10 hours, laboratory—variable; clinical clerkship—full time (2 to 12 weeks). Prerequisite: core medicine clerkship. Students will do clinical consultations in Infectious Diseases under supervision of a fellow in infectious diseases and attending physician. Students will participate actively in conferences and attending rounds with optional participation in the diagnostic laboratory.

**480. Insights in Infectious Diseases** (1-3) I, II, III, IV. Goldstein

Clinical experience—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. Student will attend infectious diseases consult rounds and also have opportunity to observe outpatient infectious disease practice and clinically related research. Introduction to diagnosis and treatment of patients in Infectious Diseases. (S/U grading only.)

**490. Seminar in Infectious and Immunologic Diseases** (2) I, II, III, IV. Goldstein and staff

Seminar—2 hours; library research. Prerequisite: Medical Sciences 431. Epidemiology, diagnosis and management of the more important infectious and immunologic diseases will be considered. Wherever possible, actual inpatients (UCD Medical Center) will be used to demonstrate evaluation of individual cases. (S/U grading only.) Limited enrollment. (May enroll for two consecutive quarters.)

**499. Research Topics in Infectious Disease** (2-12) I, II, III, IV. The Staff (Goldstein in charge)

Prerequisite: successful completion of the first year of study in School of Medicine, graduate students,† 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. (S/U grading only.)

**Internal Medicine—Nephrology****Upper Division Course**

**192. Internship in Nephrology** (1-12) I, II, III, IV.

Gulyassy and staff

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in nephrology. May be repeated for credit up to 12 units. (P/NP grading only.)

**Professional Courses**

**460. Nephrology and Fluid Balance** (6-12) I, II, III, IV. Gulyassy and staff

Clinical activity—full time. Prerequisite: completion of third year of medical school; consent of instructor. 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. Limited enrollment.

**461. Nephrology, Fluid and Electrocytes** (4.5-18) I, II, III, IV. Kayser

Lecture—6 hours; discussion—10 hours; clinical activity—full time (3 to 12 weeks). Prerequisite: fourth-year medical student with consent of instruc-

tor. Active participation in all clinical activities and conferences at the Martinez VA Hospital and attendance at specific lectures covering the field of nephrology and fluid balance. Limited enrollment.

**499. Research in Nephrology** (3-18) I, II, III, IV.

Gulyassy

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. (S/U grading only.)

**Internal Medicine—Nutrition****Upper Division Course**

**192. Internship in Clinical Nutrition** (1-12) I, II, III, IV. Halsted, McCamish, Phinney, and staff

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in nutrition. May be repeated for credit up to 12 units. (P/NP grading only.)

**Graduate Course**

**290C. Clinical Nutrition Research Conference** (1) I, II, III. Halsted, Phinney, McCamish, Davis

Seminar—1 hour. Weekly seminar presented by a graduate student, taking the form of research completed or in progress, topic review or journal review from current journal. (S/U grading only.)

**Professional Courses**

**461. Nutrition Clinical Clerkship** (3-18) I, II, III, IV.

Halsted, McCamish, Phinney, and staff

Lecture—2 hours; clinical experience—full time (2 to 12 weeks). In-depth experience in assessment and monitoring of nutritional support of adult patients at UCD Medical Center whose illnesses are complicated by malnutrition, and of patients attending the Nutrition Clinic with problems in under-nutrition due to various illnesses.

**480. Insights in Clinical Nutrition** (1-3) I, II, III, IV.

Halsted, McCamish, Phinney, and staff

Clinical experience—3-9 hours. Prerequisite: student in good standing; consent of instructor. Student will attend weekly clinical nutrition consult rounds (four evenings) and/or Nutrition Clinic (one day). Introduction to diagnosis and treatment of common nutritional problems. (S/U grading only.)

**499. Research in Nutrition** (9-18) I, II, III, IV. Halsted, McCamish, Phinney, Davis

Prerequisite: medical student in good standing; consent of instructor. Participation in on-going clinical or basic nutrition research. Student may devise own project depending upon time commitments.

**Internal Medicine—Occupational and Environmental Health****Upper Division Courses**

**192. Research Conference in Occupational and Environmental Health** (1) I. Beaumont; II. Samuels; III. McCurdy; IV. Gold

Discussion—1 hour. Prerequisite: consent of instructor. Weekly conference on research problems, progress and techniques in occupational and environmental health. Critical discussion of recent journal articles. May be repeated for credit. (P/NP grading only.)

**192. Internship in Occupational and Environmental Health**

(1-12) I, II, III, IV. Schenker and staff

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in occupational and environmental health. May be repeated for credit up to 12 units. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates**

(1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**250. Pesticide Epidemiology** (3) I, III. Goldsmith

Discussion—1 hour; seminar—2 hours. Prerequisite: medical students; graduate students in biological or environmental health sciences who have completed or are enrolled in Epidemiology and Preventive Medicine 405; upper division undergraduate who has completed Environmental Studies 126; consent of instructor. Examination of the human health effects and the risk of disease from occupational and community exposure to pesticides. Some of the clinical endpoints include cancer, neurotoxic effects, reproductive impairment, and dermatologic conditions.

**251. Environmental Epidemiology** (3) II. Gold

Discussion—1 hour; seminar—2 hours. Prerequisite: Epidemiology and Preventive 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 (and occupational) exposure to toxic waste.

**Professional Courses**

**466. Occupational and Environmental Medicine Elective** (6-12) I, II, III, IV. Schenker

Clinical and laboratory experience—full time (4 to 8 weeks). Prerequisite: fourth-year student and consent of instructor. Participate in activities of Occupational and Environmental Health Unit. Major activity is involvement in an epidemiologic research project of the University. Also participate in Ambulatory Occupational and Environmental Medicine Clinic at UCD Medical Center. (S/U grading only.)

**480. Insights in Occupational and Environmental Medicine** (1-3) I, II, III, IV. Schenker

Clinical experience—3-9 hours; small research projects. Prerequisite: first- or second-year medical student in good standing; consent of instructor. Students will 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. Students develop and present small individual research projects. (S/U grading only.)

**499. Research** (1-12) I, II, III, IV. Schenker and staff

Laboratory—40 hours; clinic—4 or 8 hours. Prerequisite: third- or fourth-year medical student or consent of instructor. Student participates in activities of Division of Occupational and Environmental Health. Major activity is involvement in an epidemiologic research project of the Division. Also participates in ambulatory Occupational and Environmental Medicine Clinic at UCD Medical Center.

**Internal Medicine—Pulmonary Medicine****Upper Division Course**

**192. Internship in Pulmonary Medicine** (1-12) I, II, III, IV. Albertson and staff

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in pulmonary medicine. May be repeated for credit up to 12 units. (P/NP grading only.)

**Graduate Course**

**210. Grant and Scientific Paper Writing** (1) I, II, III, IV. Last

Discussion—2 hours. Basics of scientific writing for grants and papers. Each student will prepare a grant or paper for critique and tutorial feedback.

**Professional Courses**

**460. Pulmonary Clinical Clerkship** (3-18) I, II, III, IV. Albertson and staff

Clinical experience—full time (2 to 12 weeks). Prerequisite: Medical Sciences 431. At UCD Medical Center participating and rounding with Pulmonary fellows and consultation staff. Also includes pulmonary function test interpretation, outpatient assignments in outpatient clinic and preparation and presentation of material at weekly conferences.

**462. Pulmonary Clinical Clerkship (3-18) I, II, III, IV.**

Krumpe and staff

Clinical activity—full time. Prerequisite: completion of second year of medical school and/or consent of instructor. Participation at the Martinez VA Hospital with members of the subspecialty service in initial clinical evaluation work-up, management, and follow-up of patients with pulmonary disorders. Includes experience in Pulmonary Function Laboratory, Respiratory Care Unit, and pulmonary diagnostic processes. Limited enrollment.

**\*464. Outpatient Program in Pulmonary Medicine (3 or 6) I, II, III, IV.** Albertson and staff

Clinical activity—two 3-hour morning sessions. Prerequisite: completion of first year of medical school; consent of instructor. Attendance one morning at TB Clinic and one morning at Pulmonary Medicine Clinic at UCD Medical Center. Students will be responsible for initial work-up of individual patients and their presentation to attending staff.

**480. Pulmonary-Critical Care Medicine Insights (1-3) I, II, III, IV.** Albertson

Clinical experience—3-9 hours. Prerequisite: student in good academic standing and consent of instructor. Student will attend respiratory outpatient clinics and in-patient pulmonary consultation rounds and medical intensive care rounds. Introduction to diagnosis and treatment of common pulmonary problems. (S/U grading only.)

**499. Research (1-12) I, II, III, IV.** The Staff (Cross in charge)

Prerequisite: consent of instructor. (S/U grading only.)

**Internal Medicine—Rheumatology-Allergy****Lower Division Course****99. Directed Research in Immunology (1-5) I, II, III, IV.** Gershwin

Laboratory—1-4 hours. 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.)

**Upper Division Courses****192. Internship in Rheumatology-Allergy (1-12) I, II, III, IV.** Gershwin and staff

Internship—3-36 hours; final report. Prerequisite: upper division standing; approval of project by preceptor prior to internship. Supervised work-study experience in rheumatology-allergy. May be repeated for credit up to 12 units. (P/NP grading only.)

**199. Directed Research in Immunology (1-5) I, II, III, IV.** Gershwin

Laboratory—1-5 hours. 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 Courses****281. Clinical Immunology and Immunopathology (4) III.** Gershwin, Robbins

Lecture—4 hours. Prerequisite: Medical Microbiology 107 or Veterinary Microbiology 270, or consent of instructor. Descriptive analysis of animal and human pathologic processes that interact with the immune system. Emphasis on infections, genetics, transplantation, allergy and autoimmunity. Offered in even-numbered years.

**298. Topics in Rheumatology and Clinical Immunology (1-5) I, II, III, IV.** Gershwin

Laboratory—1-5 hours. Prerequisite: consent of instructor. Library and/or laboratory work as required. (S/U grading only.)

**299. Research in Autoimmune Disease (1-12) I, II, III, IV.** Gershwin

Laboratory—1-12 hours. 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 Courses****460. Rheumatology Clinical Clerkship (1-18) I, II, III, IV.** Leek and staff

Inpatient-outpatient clinical activity—full time. 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.

**461. Allergy Clinical Clerkship (3-18) I, II, III, IV.**

Gershwin and staff

Inpatient-outpatient clinical activity—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.

**480. Insights in Rheumatology (1-3) I, II, III, IV.**

Leek

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. (S/U grading only.)

**499. Research (1-12) I, II, III, IV.** The Staff (Gershwin in charge)

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. (S/U grading only.)

**Medical Microbiology****Upper Division Courses****107. Chemical and Cellular Immunology (4) II.**

Benjamini, Scibienki

Lecture—4 hours. Prerequisite: Biochemistry 101A, 101B or consent of instructor. Chemical and cellular basis of immunity: structure-function relationship of antigens, antibodies and their interactions; molecular basis of antibody diversity; cellular basis of immunity; immunochemical and cellular aspects of hypersensitivity; immunogenetics and regulation of the immune response. (Same course as 407.)

**115. Ecological Parasitology (2) II.** Thesis

Lecture—2 hours. Course will be devoted to the study of mankind's influence on environmental factors that affect the development and spread of parasitic agents.

**116. Parasitology for Wildlife Biologists (2) III.**

Theis

Lecture—2 hours. Prerequisite: upper division standing in wildlife biology or biological sciences or ecology. Emphasis on the role diseases and parasites play in wildlife dynamics. Lectures on techniques of collection, preservation and methods of surveying wildlife for parasites and the pathogenesis, ecology and zoonotic potential of parasites encountered by wildlife biologists.

**130. Medical Mycology (2) II.** Pappagianis

Lecture—2 hours. Prerequisite: a course in pathogenic microbiology; consent of instructor. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. Offered in even numbered years. (Same course as 430.)

**192. Internship in Medical Microbiology (1-12) I, II, III, IV.** The Staff (Beaman in charge)

Work-learn experience—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work-study experience in medical microbiology and related fields. (P/NP grading only.)

**198. Group Study in Medical Microbiology (1-5) I, II, III, IV.** The Staff (Beaman in charge)

Hours to be arranged. 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) I, II, III, IV.** The Staff (Beaman in charge)

Hours to be arranged. Prerequisite: upper division standing and consent of instructor. Individual research. (P/NP grading only.)

**Graduate Courses****209. Frontiers in Immunology (2) I, II, III.** Benjamini, Scibienki

Discussion—2 hours. Prerequisite: consent of instructor. Current developments in various aspects of immunology and their interrelationships. (S/U grading only.) (Same course as 409.)

**215. Medical Parasitology (5) I.** Theis

Lecture—3 hours; laboratory—6 hours. Prerequisite: graduate students with consent of instructor. Epidemiological, pathogenesis, diagnostic methods and laboratory studies of protozoa, helminths and arthropods of medical importance. Offered in even-numbered years. (Same course as 415.)

**220. Current Concepts in Bacterial Ultrastructure (2) III.** Beaman

Discussion—2 hours; student presentations; term paper. Prerequisite: Microbiology 105 or consent of instructor. Critical evaluation of current literature dealing with all aspects of bacterial ultrastructure. Discussion of selected and assigned reading and formal student presentations of assigned topics.

**298. Group Study in Medical Microbiology and Immunology (1-5) I, II, III, IV.** The Staff (Beaman in charge)

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) I, II, III.** The Staff (Beaman in charge)

Prerequisite: consent of instructor; open to graduate students. Laboratory investigation contributing to the dissertation for a graduate degree. (S/U grading only.)

**Professional Courses****405. Immunologic Prophylaxis (2) II.** Pappagianis

Lecture—2 hours. Prerequisite: consent of instructor. Bases of immunization practices and immunoserologic diagnostic procedures particularly related to diseases of man. (S/U grading only.)

**407. Chemical and Cellular Immunology (4) II.**

Benjamini, Scibienki

Lecture—4 hours. Prerequisite: medical student with consent of instructor. Chemical and cellular basis of immunity: structure-function relationship of antigens, antibodies and their interactions; molecular basis of antibody diversity; cellular basis of immunity; immunochemical and cellular aspects of hypersensitivity; immunogenetics and regulation of the immune response. (S/U grading only.) (Same course as 107.)

**409. Frontiers in Immunology (2) I, II, III.** Benjamini

Discussion—2 hours. Prerequisite: consent of instructor. Current developments in various aspects of immunology and their interrelationships. (Same course as 209.)

**\*411. Tissue Typing (1-4) I, II, III, IV.** Chang

Individualized instruction, discussion—1-3 hours and laboratory—3-9 hours. Prerequisite: course in immunology; consent of instructor. Principle and technique of tissue typing through assigned reading and laboratory instruction. Contents will vary according to the needs of the students. (S/U grading only.)

**415. Medical Parasitology (5) I.** Theis

Lecture—3 hours; laboratory—6 hours. Prerequisite: medical student with consent of instructor. Epidemiological, pathogenesis, diagnostic methods and laboratory studies of protozoa, helminths and arthropods of medical importance. Offered in even-numbered years. (S/U grading only.) (Same course as 215.)

**420. Current Concepts in Bacterial Ultrastructure (2) III.** Beaman

Discussion—2 hours; formal presentation or term paper. Prerequisite: medical students with consent of

instructor. Evaluation of current status of bacterial ultrastructure with an emphasis on host-parasite interactions through discussions and assigned readings. (S/U grading only.)

**430. Medical Mycology (2) II. Pappagianis**

Lecture—2 hours. Prerequisite: a course in pathogenic microbiology; consent of instructor. Various aspects of pathogenic fungi, particularly affecting humans, will be discussed including epidemiology, pathogenesis and pathology, diagnosis and therapy. Offered in even-numbered years. (Same course as 130.)

**480A. Medical Immunology (2.5) III. Scibienksi, Benjamin**

Lecture—7 hours (four weeks only). Prerequisite: approval by Committee on Student Evaluation and Promotion. Presents the structure and function of the molecules, cells, and tissues involved in immunity, and their interactions in health and disease.

**480B. Pathogenic Microbiology (7) I. Beaman and staff**

Lecture—64 hours total; laboratory—28 hours total. Prerequisite: second-year medical students with consent by Committee on Student Evaluation and Promotion. Biology of pathogenic microorganisms with emphasis on their role in human disease.

**497T. Tutoring in Medical Microbiology (1-5) I, II, III, IV. Beaman and staff**

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. (S/U grading only.)

**498. Group Study in Medical Microbiology and Immunology (1-5) I, II, III, IV. The Staff (Beaman in charge)**

Prerequisite: medical students with consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics. (S/U grading only.)

**499. Research (1-12) I, II, III, IV. The Staff (Beaman in charge)**

Prerequisite: medical students with consent of instructor. (S/U grading only.)

## Neurology

### Lower Division Course

**199. Individual Special Study and Research (1-4) I, II, III, IV. The Staff (Chairperson in charge)**

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 Courses

**201. Human Behavioral Neurobiology (2) II.**

Jagust, Robertson

Lecture-discussion—2 hours. Prerequisite: Human Anatomy 203; Psychology 108 or 136. Neurobiology of normal and abnormal behavior of humans, based on specific neuroanatomical, neurophysiological, and cognitive parameters. Evaluation of these parameters will be, for example, by application of clinical neurologic, neuropsychologic, and neuroimaging tests.

**290. Seminar in Selected Topics (1) I, II, III, IV.**

Scobey, Gorin

Seminar—1 hour. Prerequisite: consent of instructor. Selected topics in Neuroscience will be offered. (S/U grading only.)

**298. Group Study (1-5) I, II, III, IV. The Staff (Gabor in charge)**

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) I, II, III, IV. Scobey**

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 Courses**

**420. Neuromuscular Pathophysiology (4) III.**

Gabor and staff

Lecture—34 hours and discussion—16 hours (50 hours total). Prerequisite: medical students with consent by Committee on Student Evaluation and Promotion. Lectures and case discussions of pathophysiology underlying neurological disorders including disorders of development, muscle, nerve, cerebral circulation, metabolism, myelin, cortical function, movement, cerebro-spinal fluid, autonomic function and special senses. Anatomical basis of clinical testing, nervous system infection, neoplasia and trauma.

**450. Clinical Neurology Clerkship (6) I, II, III, IV.**

Gabor and staff

Clinical activity—full time. Prerequisite: fourth-year medical student. Essentials of a detailed neurological examination and principles of differential neurological diagnosis. Emphasis on common neurological disorders encountered in practice.

**451. Clinical Neurology Clerkship (6) I, II, III, IV.**

Remler and staff

Clinical activity—full time (4 weeks at Martinez VA Hospital). Prerequisite: fourth-year medical student. Essentials of detailed neurological examination and principles of differential neurological diagnosis. Emphasis on common neurological disorders encountered in practice.

**452. Advanced Clinical Neurology (6) I, II, III, IV.**

Gabor and staff

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.

**453. Advanced Clinical Neurology (6) I, II, III, IV.**

Remler and staff

Clinical activity—full time (4 weeks at Martinez VA Hospital). 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.

**454. Electroencephalography and Evoked Potentials (18) I, II, III, IV. Gabor, Seyal**

Clinical activity—full time (12 weeks) technique and interpretation. Prerequisite: four-week Neurology clerkship and consent of instructor. Principles of electroencephalographic diagnosis including technical basis of electroencephalography and evoked potentials. Emphasis placed on how these studies are applied to neurological diagnosis.

**455. Child Neurology (6) I, II, III, IV. Gospé**

Clinical activity—full time (4 weeks). Prerequisite: satisfactory completion of Medical Sciences 431, 432A, and 432B 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.

**456. Cortical Neurology (18) I, II, III, IV. Remler, Knight**

Clinical neurological research—full time (12 weeks at Martinez VA Hospital). Prerequisite: course 451 or the equivalent; consent of instructor. Student will pursue small project in clinical neurologic research on higher cortical functions. Focus on scientific analysis of behavior in disease states.

**457. Special Topics in Neurology (18) I, II, III, IV. The Staff**

Clinical activity—full time (12 weeks). Prerequisite:

fourth-year medical student having completed four-week Neurology clerkship, or consent of instructor. Students study areas of special interest in tutorial manner under supervision of member of faculty with expertise and interest in elected field. Students may elect tutorial clinical experience with member of staff.

**458. Cognitive and Communication Disorders: Introduction to Cognitive and Communication Disorders (3) I. Wertz**

Lecture—3 hours; observations, individual projects. Prerequisite: consent of instructor. Introduction to cognitive and communication disorders. Includes a survey of disorders subsequent to brain damage; management by neurology, neuropsychology, and speech pathology; and current research on appraisal, diagnosis, and treatment. Offered in the Martinez VA Medical Center. (S/U grading only.)

**459. Cognitive and Communication Disorders: Independent Study in Neurogenic Communication Disorders (1-3) I, II, III, IV. Wertz**

Conference, observation and data collection—3-9 hours. Prerequisite: consent of instructor. Independent study of neurogenic communication disorders—aphasia, dementia, apraxia of speech, dysarthria. Designed for individual interest and includes discussion, directed reading, research design, data collection, and preparation of results. Offered in the Martinez VA Medical Center. (S/U grading only.)

**464. Clinical Neurology (3-18) IV, I, II, III. The Staff (Gabor in charge)**

Clinical activity—full time (minimum of one-half quarter). Prerequisite: fourth-year medical student or third-year medical student with completion of a medical clerkship; consent of Chairperson. Clerkship in neurology to be arranged at another institution with accredited residency programs in neurology under proper supervision.

**468. Special Clinical Elective in Neurology (9) IV, I, II, III. Gabor, Seyal, Davis**

Clinical activity—full time (4 to 12 weeks). Prerequisite: fourth-year medical students and third-year medical students with clerkship in medicine and pediatrics (from outside medical schools). Student will function as acting intern on neurology service. Emphasis will be on mastering neurologic examination and on introduction to neurologic evaluation, diagnosis, and therapy.

**480. Insights in Neurology (1-3) I, II, III, IV. The Staff**

Discussion—3 hours; clinical experience—3 to 9 hours. Prerequisite: student in good academic standing; consent of instructor. Attendance at neurology grand rounds and regular rounds following. (S/U grading only.)

**499. Research (1-12) I, II, III, IV. The Staff (Gabor in charge)**

Laboratory—2-24 hours. Prerequisite: consent of instructor. Laboratory investigation on selected topics. (S/U grading only for graduate students.)

## Neurosurgery

### Upper Division Course

**199. Special Study in Neurosurgery for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)**

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 Course

**299. Neurosurgery Research (3-12) I, II, III, IV. The Staff (Chairperson in charge)**

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 Courses

**451. Neurosurgical Critical Care Clerkship (3) I, II, III. The Staff (Chairperson in charge)**

Clinical activity—full time (2 weeks). Prerequisite: third- or fourth-year medical student having comple-

ed 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.

**460. Clinical Neurosurgery** (6-18) I, II, III, IV. The Staff (Chairperson in charge)

Clinical activity—full time (3 days per unit; 4 weeks minimum). Prerequisite: third- and fourth-year medical students; consent of instructor.† 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.

**464. Externship** (6-18) I, II, III, IV. The Staff (Chairperson in charge)

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.

**465. Clinical Neurosurgery Martinez VA Medical Center** (6 or 18) I, II, III, IV. Andrews and staff

Clinical activity—full time (4 to 12 weeks). Prerequisite: third- or fourth-year medical students or consent of instructor. Patient work-up, peri-operative care, and frequent first or second assisting in the operating room. Close integration with active Neurology Service insures in-depth exposure to the neurological history examination and diagnostic procedures for patients with nervous system disorders.

**470. Advanced Clinical Neurosurgery** (6-18) I, II, III, IV. The Staff (Chairperson in charge)

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.

**\*480. Insights in Neurosurgery** (1-3) I, II, III, IV. The Staff

Clinical experience—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. (S/U grading only.)

**499. Neurosurgery Research** (6-18) I, II, III, IV. The Staff (Chairperson in charge)

Prerequisite: medical student with consent of instructor. Student may participate in ongoing neurosurgical projects or may pursue and design independent projects. (S/U grading only.)

## Obstetrics and Gynecology

### Lower Division Courses

**190. Seminar in Early Mammalian Development**

(1) I, II, III. Wiley

Seminar—1 hour; short paper. Prerequisite: Zoology 100 or the equivalent. Each student will present paper from the recent scientific literature on various research topics in early mammalian development. Short paper at the end of course.

**198. Directed Group Study** (1-5) I, II, III, IV. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III, IV. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**290. Current Topics in Research** (1) I, II, III, IV. The Staff

Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Selected topics in reproductive biology. (S/U grading only.)

**291. Seminar in Early Mammalian Development**

(1) I, II, III, IV. Wiley

Seminar—1 hour. Each student will be asked to present a paper from the recent scientific literature on various research topics in early mammalian development. Short paper will be required at the end of course.

**298. Group Study** (1-5) I, II, III, IV. Overstreet

Prerequisite: graduate standing; consent of instructor.

**299. Research** (1-12) I, II, III, IV. Overstreet

Prerequisite: graduate standing; consent of instructor. (S/U grading only.)

### Professional Courses

**\*401. Discussions in Obstetrics and Gynecology**

(2) I, II, III, IV. Hanson and staff

Discussion—2 hours. Prerequisite: second-year medical students; consent of instructor. Obstetrics and gynecology history taking and examination, an overview of the physiology and pathology of the female reproductive tract, and a consideration of the reaction of the female to pelvic disease and to her sexual identity.

**\*420. Reproductive System and Perinatology** (2) I.

The Staff (Obstetrics and Gynecology, Pediatrics)

Lecture—20 hours total; discussion—2 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Normal structure and function of reproductive system are presented. Abnormalities in perinatology are approached by study of appropriate clinical problems. (Same course as Pediatrics 420.)

**\*460. Elective Clerkship** (4-18) I, II, III, IV. Schneider and staff

Clinical activity—full time (3 days per unit). Prerequisite: third- and fourth-year medical students; Medical Sciences 432A; consent of instructor. Active participation in inpatient and outpatient care at San Joaquin General Hospital. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit.

**\*462. Elective Clerkship** (4-18) I, II, III, IV. Schneider.

Clinical activity—full time (3 days per unit). Prerequisite: third- or fourth-year medical students; Medical Sciences 432A; consent of instructor. Student will participate actively in outpatient care at Planned Parenthood Association, Sacramento. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit.

**\*464. Obstetrics and Gynecology Clerkship** (4-18)

I, II, III, IV. Schneider.

Clinical activity—full time (3 days per unit). Prerequisite: third- and fourth-year medical students; Medical Sciences 432A; consent of instructor. Active participation in inpatient and outpatient care at Woodland Memorial Hospital. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit.

**465. Elective Clerkship** (4-18) I, II, III, IV. The Staff

Clinical activity—full time (3 days per unit). Prerequisite: third- and fourth-year medical student; Medical Sciences 432A (or the equivalent); consent of instructor. Active participation in inpatient and outpatient care. Attendance at specified conferences; student-faculty member informal conferences. May be repeated for credit.

**\*466. Obstetrics: Adolescent Pregnancy** (4-18) I,

II, III, IV. Meyers

Seminar; clinical activity—individually arranged. Prerequisite: two years of medical school; consent of instructor. Direct clinical contact with at least two adolescent pregnancies provided over ten-week period. Emphasis on obstetrical and psychological clinical issues of pregnancy, delivery, the puerperium and neonatal interaction. Relevant literature will be reviewed.

**\*469. Perinatal Medicine Clerkship** (4-18) I, II, III,

IV. Hanson and staff (of Maternal/Fetal Medicine Division)

Prerequisite: fourth-year medical students; consent of instructor. Management of consultation for such

problems as toxemia, diabetes, hypertension, cardiac disease, premature labor, etc., and all types of intrapartum problems, as well as exposure to ultrasound, amniocentesis and genetic counselling.

**470. Acting Internship in Obstetrics and Gynecology** (6-8) I, II, III, IV. Oi

Clinical activity—full time (4-6 weeks). Prerequisite: third- and fourth-year medical students who have completed Medical Sciences 432A; consent of instructor. Student will perform as intern and expect the following experience: Obstetrics and Gynecology, 2 weeks each; perform inpatient care; be on call every third night; attend scheduled conferences one half-day per week. Round daily with attending.

**471. Ambulatory Gynecology and Obstetrics** (6-8)

I, II, III, IV. MacKay

Clinical activity—full time (4-6 weeks). Prerequisite: third- and fourth-year medical students who have completed Medical Sciences 432A; consent of instructor. Student to participate in following clinics each week: General Gynecology, New and Return Obstetrics, Post-Partum, High-Risk Obstetrics, Pre-Operation Clinic, other specialty clinics as assigned. Student will conduct examinations, present patients to staff and will be able to discuss treatment regimens. Night call in Labor and Delivery Suite every third night.

**499. Research in Obstetrics and Gynecology** (4-

18) I, II, III, IV. Chang and staff

Prerequisite: medical student with consent of instructor. Student will pursue a research problem of her/his own choosing, selected with help of the faculty. Integration with ongoing faculty research projects recommended. (S/U grading only.)

## Ophthalmology

### Upper Division Course

**192. Research Internship** (1-12) I, II, III, IV. The Staff

Work-learn experience—3-36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work-study 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) I, II, III, IV. The Staff

Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Course

**299. Basic Research in Visual Science** (1-12) I, II,

III, IV. The Staff

Prerequisite: consent of instructor. (S/U grading only.)

### Professional Courses

**440. Ophthalmology Required Clerkship** (3) I, II,

III, IV. Mannis

Clinical clerkship—full time (2 weeks). Prerequisite: consent by Committee on Student Evaluation and Promotion. Fundamental knowledge of ophthalmic diagnosis and principles; basic ophthalmic instruments; understanding of treatment for eye problems manageable by a primary care physician; knowledge of what patients should be referred for ophthalmic care.

**461. Basic Clinical Ophthalmology** (4.5) I, II, III, IV.

Roth

Clinical activity—to be arranged (3 weeks). Prerequisite: medical students who have completed either Medical Sciences 430 or course 440 (in third or fourth year); consent of instructor. Provides an acquaintance with the fundamentals of routine clinical ophthalmology.

**465. Advanced Subspecialty Ophthalmology** (6 or

9) I, II, III, IV. Mannis, Keltner

Clinical activity—to be arranged (4 weeks off campus or 6 weeks at UCD Medical Center). Prerequisite: medical students who have completed either Medical Sciences 430 or course 440 (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. Rotations at UCD Medical Center may be arranged in 6-week units of one service alone, or in combination, as arranged with instructors.

**480. Insights in Ophthalmology** (1-3) I, II, III, IV.

Mannis and staff

Clinical experience—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Clinical exposure in ophthalmology including slide-tape program, patient exposure, and department conferences (i.e., grand rounds and subspecialty conference). (S/U grading only.)

**481. Group Study** (1-3) I, II, III, IV. The Staff (Roth in charge)

Prerequisite: medical students with consent of instructor. Directed reading and discussion. (S/U grading only.)

**499. Research in Ophthalmology** (1-12) I, II, III, IV.

The Staff

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. (S/U grading only.)

## Orthopaedic Surgery

### Lower Division Course

**\*499. Special Studies for Undergraduates** (1-4) I, II, III, IV. The Staff (Chairperson in charge)

Prerequisite: lower division standing. (P/NP grading only.)

### Upper Division Course

**\*199. Special Studies for Advanced Undergraduates** (1-5) I, II, III, IV. The Staff (Chairperson in charge)

Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

### Professional Courses

**401A. Sports Medicine: Medical Aspects of Sports Injuries** (3) I. Marder

Lecture—2 hours; laboratory—1 hour. Prerequisite: completion of first year of medical school. Multidisciplinary course introducing student to the pathophysiology of sport injuries, physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. (S/U grading only.) (Same course as Physical Medicine and Rehabilitation 401A.)

**\*421. Skeletal System** (2.5)

Lecture—20 hours total; discussion—12 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Provides a basic science understanding of normal and abnormal skeletal and joint development, physiology, and pathology. Clinical correlates are provided only as a supplement to emphasize cause and effect phenomena as it relates to bone and joint disease.

**426. Initial Management of Musculoskeletal Trauma** (3-6) I, II, III, IV. Rodrigo

Clinic—full time (2 to 4 weeks). Prerequisite: third- or fourth-year student in good academic standing; completion of human anatomy and consent of instructor. Elective providing opportunity to observe and assist in emergency and operating rooms in management of orthopaedic problems of trauma under supervision of resident on call. Does not meet surgical specialty requirement. Limited enrollment.

**428. Ambulatory Orthopaedics** (3-6) I, II, III, IV.

Rodrigo

Clinic—full time (2 to 4 weeks). Prerequisite: third- or fourth-year student in good academic standing; and consent of instructor. Introduction to general orthopaedic problems and their management in an outpatient environment. Students will conduct orthopaedic examinations, present patients to staff, and lead discussion of treatment regimens. Emphasis placed on orthopaedic physical exam and interpretation of x-rays. Does not meet surgical specialty requirement. Limited enrollment.

and equilibrium. Each student will be expected to make one class presentation.

**440. Clinical and Surgical Orthopaedics** (6) I, II, III, IV. Rodrigo

Clinical experience—full time (4 weeks). Prerequisite: third- or fourth-year student in good academic standing; and consent of instructor. Rotation on an assigned orthopaedic service, emphasizing didactic teaching, related to the musculoskeletal system. Out-patient/in-patient rounds, emergency room and operating room exposure. Meets surgical specialty requirement.

**462. Community Preceptorship** (6) I, II, III, IV.

Rodrigo

Clinical experience—full time (4 weeks). Prerequisite: third- or fourth-year student in good academic standing and consent of instructor. Designed to acquaint student with private practice of orthopaedics in the community setting. Opportunity to observe and assist private practitioners in office, emergency room and inpatient environment. Preceptorships available in Sacramento and surrounding areas. Student must provide own transportation.

**464. Acting Internship** (6) I, II, III, IV. Rodrigo

Clinical experience—full time (4 weeks). Prerequisite: third- or fourth-year student in good academic standing; and 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. Does not meet surgical specialty requirement.

**480. Insights in Orthopaedic Surgery** (1-3) I, II, III, IV. Szabo

Clinical experience—3 to 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. (S/U grading only.)

**499. Orthopaedics Research** (1-12) I, II, III, IV. The Staff (Rodrigo in charge)

Clinic—3 hours to full time (to be arranged with individual faculty). Prerequisite: third- or fourth-year student in good academic standing; consent of instructor. Laboratory or clinical investigation on selected topics. (Does not meet surgical specialty requirement.) (S/U grading only.)

## Otolaryngology

### Lower Division Courses

**\*192. Internship In Otolaryngology** (1-12) I, II, III, IV. Chairperson in charge

Project study—3 to 36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work-learn experience in otolaryngology and related fields. Final project report. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study in Otolaryngology for Advanced Undergraduates** (1-5) I, II, III, IV. The Staff (Chairperson in charge)

Prerequisite: advanced undergraduate with consent of instructor. (P/NP grading only.)

### Graduate Courses

**290C. Research Conference in Otolaryngology** (1) I, II. The Staff

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.)

**291. Principles of Speech, Hearing and Equilibrium** (3) II. The Staff

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.

**298. Group Study** (1-5) I, II, III, IV. The Staff (S/U grading.)

**299. Individual Study in Otolaryngology for Advanced Graduate Students** (1-12) I, II, III, IV. Chole and staff

Prerequisite: advanced graduate student with consent of instructor. (S/U grading only.)

### Professional Courses

**\*400. Suture Techniques** (1) I, II, III, IV. The Staff

Lecture—5 hours total; laboratory—10 hours total. Prerequisite: second- and fourth-year medical students with consent of instructor; open to graduate and veterinary medical students. Principles of management of lacerations and the various techniques of suturing a wound.

**401. Clinical Examinations in Otolaryngology** (1) I, II, III, IV. Chole

Lecture—1 hour; laboratory—1 hour; practical—1 hour total. Prerequisite: second-year medical students with consent of instructor; open to graduate students.† Obtaining the history, applied anatomy of the regions, and the art of the examination. Head mirror required.

**402. Otolaryngology in Family Practice** (1) I, II, III, IV. Lecture—10 hours total. Prerequisite: fourth-year medical students and family practitioners with consent of instructor; open to graduate students.† Planned as a refresher course for those already possessing a background of knowledge in the specialty.

**403. Basic Principles of Reconstructive Surgery**

(1) II. Donald

Lecture—four 2-hour sessions; laboratory—one 2-hour session (5 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 devoted to utilizing animal tissues.

**440. Otolaryngology Required Clerkship** (3) I, II, III, IV.

Clinical clerkship—full time (2 weeks). Prerequisite: consent by Committee on Student Evaluation and Promotion. Provides fundamental knowledge of otolaryngologic diagnosis and principles, develops facility with basic Ear, Nose and Throat instruments, provides an understanding of treatment for ear, nose and throat problems manageable by a primary care physician, provides knowledge of what patients should be referred for otolaryngologic care.

**460. Clinical Otolaryngology Elective** (3-18) I, II, III, IV.

Full-time clinical activity. Prerequisite: third- and fourth-year medical students with consent of instructor; open to graduate students.† Total involvement in clinical activities of the department.

**\*465. Surgical Team Participation: Martinez VA Medical Center** (6-12) I, II, III, IV.

Clinical clerkship—full time (4 to 8 weeks). Prerequisite: third- or fourth-year medical student; Medical Sciences 430. Student will work with Ear, Nose and Throat resident involved with inpatient care and clinics in treatment of head and neck tumors. Surgical oncology involving radiotherapy and surgical reconstruction after ablative cancer surgery is stressed. Supervision and training by attending staff. (S/U grading only.)

**480. Insights in Otolaryngology** (1-3) I, II, III, IV.

Senders

Clinical experience—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Individualized activities (depending upon time available and previous exposure to Ear, Nose and Throat) including observing patient exams, ward rounds and attendance at lectures and grand rounds. (S/U grading only.)

**\*490. Journal Seminar** (1) I, II, III, IV. Donald, Chole

Lecture-discussion—10 hours total (course given three times per quarter). Prerequisite: fourth-year medical students with consent of instructor; open to

graduate students.† Monthly review of current otolaryngologic and related literature and recent advances.

**498. Individual or Group Study (1-5) I, II, III. The Staff**

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. (S/U grading only.)

**499. Research (1-12) I, II, III, IV. The Staff**

Prerequisite: medical students with consent of instructor; open to graduate students.† Participation in ongoing projects.

## Pathology

### Upper Division Courses

**192. Internship in Human Pathology (1-12) I, II, III, IV. The Staff**

Work-learn experience—3-36 hours; final project report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work-study experience in pathology and related fields. (P/NP grading only.)

**199. Special Study in Pathology for Advanced Undergraduates (1-5) I, II, III, IV. The Staff (Chairperson in charge)**

Prerequisite: advanced undergraduate, and consent of instructor. (P/NP grading only.)

### Graduate Courses

**202. Current Topics in Tumor Biology (2) I, II, III, IV. Cardiff**

Seminar—2 hours. Prerequisite: consent of instructor. Discussion of current topics in tumor biology by invited speakers and members of the class. A forum for presentation of proposed and completed experiments by persons interested in tumor biology.

**207. Introduction to Nervous System Pathology (1-4) I, II, III, IV. Ellis**

Seminar—1-4 hours. Prerequisite: consent of instructor; open to advanced undergraduate, graduate, veterinary medical, and medical students. Study of nervous system tissue responses to injury, infection, neoplasia, and malformation in both the human and experimental animal. Seminars include correlation of clinical, gross and microscopic findings. Discussions provide instruction in microscopic techniques.

**210. Introduction to Human Pathology (5) III. C. Miller**

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: graduate or upper division students with background in gross and microscopic anatomy, physiology and biochemistry. Study of the processes, causes and effects of disease, including inflammation, neoplasia, immunology, parasitism, degeneration, abnormalities of growth, and injuries due to environmental and toxic agents. Course not intended for veterinary medical or medical students.

**298. Advanced Group Study (1-5) I, II, III, IV. The Staff**

Prerequisite: consent of instructor.

**299. Research (1-12) I, II, III, IV. The Staff**

Prerequisite: consent of instructor. (S/U grading only.)

### Professional Courses

**404. Forensic Pathology (2) III. Tesluk**

Independent study. Prerequisite: medical student or consent of instructor. Provides a systematic study of current forensic cases with emphasis on differential diagnosis, preservation of evidence, and medical-legal procedures. Includes an introduction to histopathologic diagnosis, ballistics, and toxicology. (S/U grading only.)

**\*405. Brain-Cutting Conference (1-4) I, II, III, IV. Ellis**

Prerequisite: third- and fourth-year medical students or consent of instructor. Current specimens are sectioned, discussed, and clinical correlations proposed.

**\*407. Diseases of the Nervous System (1-3) I, II, III, IV. Ellis**

Lecture—1 hour; discussion—1 hour; seminar—1 hour. Prerequisite: third- and fourth-year medical stu-

dents or special training in pathology or neurological sciences; consent of instructor. Study of human nervous system reactions to disease including infection, neoplasia and maldevelopment; application of experimental models to human disease; and clinical correlations. Seminars emphasize microscopic findings in current cases; discussions include individualized experience in neuropathologic techniques. Given jointly with the Departments of Neurology and Neurosurgery.

**\*408. Autopsy Case Studies (1-12) I, II, III, IV. Ruebner**

Discussion—1-4 hours; laboratory—3-24 hours. Prerequisite: medical student or consent of instructor. Participation and/or performance, under supervision, of complete autopsies with correlative discussion of clinical material, gross, microscopic and laboratory findings.

**411. Pathology I (5) III. Ruebner**

Lecture—4 hours (five weeks only); laboratory—7 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Introduces basic human disease processes. Mastery of pathophysiology and vocabulary is stressed. Methods of examining gross and microscopic tissue sections are taught.

**423. Systemic Pathology (8.5) IV. Cardiff**

Lecture—57 hours total; laboratory—90 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Important and common diseases of human organ systems. Pathophysiologic basis of disease in the clinical setting

**424. Laboratory Medicine (2) III. Kost**

Lecture—13 hours, discussion—1 hour, and laboratory—11 hours (25 hours total). Prerequisite: medical student with approval by Committee on Student Evaluation and Promotion. Course provides a fundamental knowledge of the role and application of modern clinical laboratory medicine. Emphasis upon optimization of selection of laboratory measurements, decision analysis, interpretation of laboratory results, solving of selected problems using laboratory measurement.

**464. Clerkship in Advanced Applied Surgical Pathology (6-9) I, II, III, IV. Tesluk**

Clinical Clerkship—full time (4-6 weeks). Prerequisite: third- or fourth-year medical student or consent of instructor. Designed to provide students with an intensive experience in surgical pathology. Participation in grossing of specimens, preparation of frozen sections and slide reading sessions as well. Students attend surgical pathology conferences and seminar sessions in which clinical correlation and diagnostic information is discussed. Limited enrollment.

**465. Applied Clinical Laboratory Immunology (9) II, III. Miller**

Clinical Clerkship—full time (6 weeks). Prerequisite: third- or fourth-year medical students with 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. (S/U grading only.)

**497T. Tutoring in Pathology (1-5) I, II, III, IV. The Staff**

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. (S/U grading only.)

**498. Advanced Group Study (1-5) I, II, III, IV. The Staff**

Prerequisite: medical student and consent of instructor. Group study in variety of advanced topics in general, special, experimental, or comparative pathology. (S/U grading only can be in effect.)

**499. Research (1-18) I, II, III, IV. The Staff**

Prerequisite: medical student with consent of instructor. Research is experimental, molecular, comparative, and applied pathology. Limited enrollment. (S/U grading only can be in effect.)

## Pediatrics

### Upper Division Course

**199. Special Study in Pediatric Research (1-5) I, II, III, IV. The Staff (Chairperson in charge)**

Prerequisite: undergraduate student with consent of instructor based upon adequate preparation as determined by instructor. (P/NP grading only.)

### Graduate Course

**299. Pediatric Research (1-12) I, II, III, IV. The Staff (Chairperson in charge)**

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 Courses

**401. Preceptorship in Pediatrics (2) I, II, III, IV.**

Chairperson in charge

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.

**402. Clinical Experience in Private Practice (1-18) I, II, III, IV. Chairperson in charge**

Clinical activity—full time (4 to 12 weeks). Prerequisite: third- or fourth-year medical student; Medical Sciences 432B; consent of preceptor and Chairperson. Opportunity to participate in practice of preceptor performing such tasks as history taking, physical examination, and patient management.

**420. Reproductive System and Perinatology (2) I.**

Wennberg and staff (Pediatrics; Neonatology)

Lecture—20 hours total; discussion—2 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Normal structure and function of reproductive system are presented. Abnormalities in perinatology are approached by study of appropriate clinical problems. (Same course as Obstetrics and Gynecology 420.)

**460A. Acting Internship: General Inpatient Pediatric Clerkship (6-18) I, II, III, IV. Halsted**

Clinical experience—full time (4 to 12 weeks). Prerequisite: completion of Medical Sciences 432B with grade of B or better; letter of recommendation from Pediatrics faculty member. 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. Limited enrollment.

**460B. Acting Internship: Outpatient Pediatrics (6-18) I, II, III, IV. Reinhardt**

Clinical experience—full time (4 to 12 weeks). Prerequisite: completion of Medical Sciences 432B with grade of B or better; letter of recommendation from Pediatrics faculty member. Supervised experience in pediatric care on outpatient service at UCD Medical Center. Student functions as "Acting Intern" with appropriate supervision by residents and attending faculty. Limited enrollment.

**461. Elective in Pediatric Hematology/Oncology (3-18) III. Abildgaard**

Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and management of hematologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment.

**462. Elective in Pediatric Endocrinology (3-18) I, II, III, IV. Connors**

Clinical experience—full time (2 to 12 weeks). Prerequisite: completion of second-year study or the equivalent; consent of instructor. Inpatient and outpatient experience in diagnosis and management of endocrine disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment.

**464. Acting Internship in Neonatology** (6-18) I, II, III, IV. Goetzman  
Clinical experience—full time (4 to 12 weeks). Prerequisite: completion of Medical Sciences 432B with grade of B or better; letter of recommendation from Pediatrics faculty member. Diagnostic and therapeutic aspect of the medical and surgical high-risk neonate. Student expected to take night call. Limited enrollment.

**465. Pediatric Specialty Clinic Elective** (3-18) I, II, III, IV. Reinhart and staff  
Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Supervised experience in a variety of pediatric subspecialty clinics. Limited enrollment.

**466. Elective in Pediatric Cardiology** (3-18) I, II, III, IV. Parrish  
Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B. Inpatient and outpatient experience in diagnosis and management of cardiologic disorders in children. Laboratory experience and participation in clinical investigation may be arranged.

**467. Elective in Pulmonary Medicine** (3-18) I, II, III, IV. McDonald, Joad  
Clinical experience—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.

**468. Elective in Pediatric Nephrology** (3-18) I, II, III, IV. Murphy  
Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and management of renal disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment.

**469. Elective in Pediatric Infectious Disease** (3-18) I, II, III, IV. Halsted  
Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and treatment of infectious disease of infants and children. Laboratory and clinical investigation may be arranged. Limited enrollment.

**470. Elective in Pediatric Neurology** (3-18) I, II, III, IV. Gospé  
Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 431, 432A, and 432B and consent of instructor. 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. Limited enrollment.

**471. Elective in Pediatric Gastroenterology** (3-18) I, II, III, IV. Cannon, Wenner  
Clinical experience—full time (2 to 12 weeks). Prerequisite: satisfactory completion of Medical Sciences 432B; consent of instructor. Inpatient and outpatient experience in diagnosis and management of gastroenterology disorders in children. Laboratory experience and participation in clinical investigation may be arranged. Limited enrollment.

**476. Acting Internship in Pediatric Intensive Care** (6-18) I, II, III, IV. Sheikh  
Clinical experience—full time (4 to 12 weeks). Prerequisite: completion of Medical Sciences 432B with grade of A or consent of instructor of record; letter of recommendation from Pediatrics faculty member. Evaluation and support of critically ill infants and children. In general, student expected to take night call every third night during rotation. Limited enrollment.

**\*499. Research Topics in Pediatrics** (1-18) I, II, III, IV. The Staff (Styme in charge)  
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. (S/U grading only.)

## Pharmacology

### Lower Division Courses

#### 92. Internship in Pharmacology

(1-12) I, II, III, IV. The Staff (Chairperson in charge)  
Work experience—3-36 hours; final report. Prerequisite: lower division student with good academic standing; approval of project prior to period of internship. Supervised work-study experience in pharmacology and related fields. (P/NP grading only.)

#### 99. Special Study for Undergraduates

(1-5) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: lower division standing. (P/NP grading only.)

### Upper Division Courses

#### 100. Pharmacology for Educators

(2) I. E. K. Killam  
Lecture—2 hours. Prerequisite: consent of instructor. Survey of the principles underlying the action of drugs; consideration of the pharmacology of prescription and non-prescription drugs commonly used to treat medical conditions in children of school age; pharmacological aspects of drug dependency and related topics.

#### 192. Internship in Pharmacology

(1-12) I, II, III, IV. The Staff (Chairperson in charge)  
Work experience—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship. Supervised work-study experience in pharmacology and related fields. (P/NP grading only.)

#### 198. Directed Group Study

(1-5) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

#### 199. Special Study for Advanced Undergraduates

(1-5) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Courses

#### 200A. Advanced General Pharmacology

(3) I. Hance and staff  
Lecture—3 hours. Prerequisite: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-113) or the equivalent. May be taken concurrently. Core course in human pharmacology designed for graduate and medical students. Principles in pharmacology, including pharmacokinetics and drug metabolism and the actions, use and toxicity of the major classes of drugs.

#### 200AL-200BL. Advanced General Pharmacology

(1-1) I, II. Stark and staff  
Discussion—1 hour; laboratory—3 hours. Prerequisite: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-113) or the equivalent (may be taken concurrently). Laboratory procedures in advanced pharmacology. Experiments and discussion designed to follow subject-matter sequence of 200A-200B.

#### 200B. Advanced General Pharmacology

(4) II. Winters and staff  
Lecture—4 hours. Prerequisite: upper division courses in biochemistry (101A-101B) and mammalian physiology (111A-111B and 112-113) or the equivalent (may be taken concurrently). Core course in human pharmacology designed for graduate and medical students. Principles in pharmacology, including pharmacokinetics and drug metabolism and the actions, use and toxicity of major classes of drugs.

#### 201. Pharmacology of the Nervous System I: Transmitter Substances

(2) I. Hance  
Lecture—2 hours. Prerequisite: courses 200A-200B

or 400A-400B, or the equivalent. Pharmacology of substances affecting nervous transmission. Offered in odd-numbered years.

#### 202. Pharmacology of the Nervous System II: Hypnotics, Sedatives and Anesthetics

(2) III. E. K. Killam  
Lecture—2 hours. Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of centrally-acting sedative, hypnotic, and anesthetic agents with emphasis on alterations in brain function. Offered in odd-numbered years. (S/U grading only.)

#### 203. Pharmacology of the Nervous System III: Stimulants and Anticonvulsants

(2) II. Stark  
Lecture—2 hours. Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Pharmacology of stimulant and convulsant agents, anticonvulsant agents and their evaluation in animal models. Offered in even-numbered years.

#### 204. Pharmacology of the Nervous System IV: Drug Alteration of Behavior

(1-3) II. K. F. Killam  
Prerequisite: courses 200A-200B or 400A-400B, or the equivalent. Activity of drugs altering mood and behavior; psychopharmacologic agents, hallucinogens, antidepressants. Offered in odd-numbered years.

#### 206. Pharmacokinetics

(2) I. Henderson  
Lecture—2 hours. Prerequisite: courses 200A, 200B. Physiochemical and physiological factors affecting absorption, distribution, metabolism and excretion of drugs. Mathematical and graphical methods for determining pharmacokinetic parameters. Calculation of dose regimens. Offered in even-numbered years.

**206L. Pharmacokinetics Laboratory** (2) I. Henderson  
Laboratory—6 hours. Prerequisite: course 206 (may be taken concurrently). Laboratory procedures for determining pharmacokinetic values in experimental animals. Exercises designed to follow subject matter sequence of course 206. Offered in even-numbered years.

#### 208. Application of Computers to Pharmacology

(1) I, II, III. The Staff  
Lecture—1 hour. Prerequisite: consent of instructor. Presentation of basic concepts and problems.

#### 210. Fundamentals of Pulmonary Toxicology and Pharmacology

(2) II. Hollinger  
Lecture—2 hours. Prerequisite: consent of instructor. Major toxicologic and pharmacologic aspects of the lung. Areas considered include: (1) basic lung structure and function, (2) respiratory and non-respiratory lung functions, (3) lung toxins and injury and, (4) principal drugs used in respiratory disorders.

#### 220. Statistical Approach to Pharmacological Research

(2) III. Hance  
Lecture—2 hours. Prerequisite: course 200A or consent of instructor. Introduction to application of statistics in pharmacological research and therapeutics, basic concepts of distributions, measures of location, dispersion and correlation, significance, probability, uncertainty, design of experiments.

#### 297T. Tutoring in Pharmacology

(1-3) I, II, III. The Staff (Chairperson in charge)  
Tutorial—3-9 hours. Prerequisite: courses 200A-200B and 200AL-200BL, or the equivalent; consent of instructor. Under supervision of the instructor, students assist in preparation and teaching of courses in Pharmacology. (S/U grading only.)

#### 298. Group Study

(1-5) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor.

#### 299. Research

(1-12) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (S/U grading only.)

### Professional Courses

#### 400A. Principles of Pharmacology

(4) I. Hance and staff  
Lecture—29 hours; discussion—16 hours; laboratory—16 hours (61 hours total). Prerequisite: consent by Committee on Student Evaluation and Promotion. Principles in pharmacology, including pharmacokinetics and drug metabolism and the actions, use and toxicity of major classes of drugs.

**400B. Principles of Pharmacology (5)** II. Winters and staff  
Lecture—38 hours total; discussion—28 hours total (includes clinical correlations). Prerequisite: consent by Committee on Student Evaluation and Promotion. Principles in pharmacology, including pharmacokinetics and drug metabolism and the actions, use and toxicity of the major classes of drugs.

**490. Seminar in Pharmacology for Medical Students (1)** I, II, III, IV. The Staff (Chairperson in charge)  
Seminar—1 hour. Prerequisite: consent of instructor. Seminar in pharmacology for medical students.

**497T. Tutoring in Pharmacology (1-5)** I, II, III, IV. Stark  
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. (S/U grading only.)

**498. Special Study for Medical Students (1-5)** I, II, III, IV. Stark and staff  
Lecture, directed reading, and/or discussion groups—3-15 hours. Prerequisite: consent of instructor. Special study in pharmacology for medical students. (S/U grading only.)

**499. Directed Research for Medical Students (1-12)** I, II, III, IV. The Staff (Chairperson in charge)  
Laboratory—3-36 hours. Prerequisite: consent of instructor. Directed research in pharmacology for medical students. (S/U grading only.)

## Physical Medicine and Rehabilitation

### Upper Division Courses

**192. Internship in Physical Medicine and Rehabilitation (1-12)** I, II, III, IV. The Staff (Entrikin coordinator)  
Work-learn experience—3-36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work-learn experience; clinical and "basic" research projects in Physical Medicine and Rehabilitation; emphasis on neuromuscular disorders; final written report. (P/NP grading only.)

**198. Directed Group Study (1-5)** I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)** I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

### Graduate Courses

**201A. Sports Medicine: Medical Aspects of Sports Injuries (3)** I. Bernauer  
Lecture—2 hours; laboratory—1 hour. Prerequisite: graduate students with upper division course in systemic physiology or anatomy, and medical students. Multidisciplinary course introducing student to the pathophysiology of sports injuries, physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. (S/U grading only.) (Same course as Physical Education 201A.)

**298. Selected Topics in Rehabilitation and Physical Medicine (1-5)** I, II, III, IV. The Staff  
Prerequisite: consent of instructor.

**299. Research (1-12)** I, II, III, IV. The Staff  
Prerequisite: consent of instructor. (S/U grading only.)

### Professional Courses

**401A. Sports Medicine: Medical Aspects of Sports Injuries (3)** I. Bernauer  
Lecture—2 hours; laboratory—1 hour. Prerequisite: medical students or graduate students with upper division course in systemic physiology or anatomy. Multidisciplinary course introducing student to the pathophysiology of sports injuries, physical examination

of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. (Same course as Orthopaedic Surgery 401A.)

**440. Rehabilitation Medicine Clerkship (3)** I, II, III, IV. Lieberman

Clinical clerkship—full time (2 weeks). Prerequisite: Third- or fourth-year medical student; consent by Committee on Student Evaluation and Promotion. Rehabilitation medicine and geriatrics relating to comprehensive care of the physically disabled and the physical medicine management of neurologic and musculoskeletal disorders. Physiological effects, indications and contraindications of the therapeutic modalities and their application to common musculoskeletal disorders.

**461. Rehabilitation Medicine Clinical Elective (5-18)** I, II, III, IV. The Staff

Clinical activity—full time. Prerequisite: completion of third year in Medical School; Medical Sciences 430, 431. Intended for non-UC medical students. Emphasis on evaluation of patients with neurological or orthopaedic problems requiring rehabilitative techniques for their management. Introduction to management of such patients. Fourth-year student may function as acting intern on Physical Medicine and Rehabilitation service.

**462. Rehabilitation Medicine Clinical Elective (5-18)** I, II, III, IV. The Staff

Clinical activity—full time. Prerequisite: Medical Sciences 430, 431; 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.

**\*480. Insights in Physical Medicine and Rehabilitation (1-3)** I, II, III, IV. The Staff

Clinical experience—3 to 9 hours. Prerequisite: first- and second-year medical students in good academic standing; consent of instructor. Exposure to aims and methods in rehabilitation medicine including ancillary therapies and related services. Development of knowledge and experience of musculoskeletal examination of patients. Observation of ward rounds and outpatient clinics. (S/U grading only.)

**498. Advanced Group Study (1-5)** I, II, III, IV. The Staff

Prerequisite: consent of instructor. Study and experience for medical students in any of a number of areas in physical medicine and rehabilitation. (S/U grading only.)

**499. Research for Medical Students (1-12)** I, II, III, IV. The Staff

Prerequisite: consent of instructor. Research on any of a variety of topics in physical medicine and rehabilitation. (S/U grading only.)

## Plastic Surgery

### Professional Courses

**460. Clinical Plastic Surgery Elective (1-18)** I, II, III, IV.

Clinical activity—full time (approximately 40 hours per week). Prerequisite: third- or fourth-year medical students; Medical Sciences 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.

**461. Dentistry for Future Physicians and Surgeons (6-8)** I, II, III, IV. Thaller

Discussion-seminar—3 hours; laboratory—2 hours; clinic activity—full time (4-6 weeks). Prerequisite: third- or fourth-year medical students. General practitioners must recognize dental-related problems, have the ability to alleviate potential pain, and be able to refer these problems for further definitive evaluation and treatment. Students will have basic knowledge of dentistry; recognize potential dental

problems; provide emergency care; have knowledge of where to refer these problems. (S/U grading only.)

**470. Microvascular Surgical Techniques in Plastic Surgery (9)** I, II, III, IV.

Discussion—4 hours; laboratory—8 hours. Prerequisite: Medical Sciences 430. Instruction in microvascular surgery with operating microscope and microsurgical instruments. It is hoped student will learn surgical techniques enabling him/her to repair vessels as small as 1-2 mm by end of course.

## Psychiatry

### Upper Division Courses

**198. Directed Group Study (1-5)** I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)** I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: advanced standing and consent of instructor. (P/NP grading only.)

### Graduate Courses

**226. Psychiatric Implications of Legal Intervention (2)** I, III. Bauer

Discussion—2 hours. Prerequisite: consent of instructor. The influence of laws on human behavior, and vice versa, will be explored. Particular emphasis on youth and juvenile court procedure. Moot court demonstrations. (Same course as Community Health 226.)

**298. Directed Group Study For Graduate Students (1-5)** I, II, III, IV. The Staff (Blacker in charge)

Prerequisite: graduate standing and consent of instructor.

**299. Special Study for Graduate Students (1-12)** I, II, III, IV. The Staff (Blacker in charge)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

### Professional Courses

**401. Medicine and the Mind: An Introduction to Psychiatry (2)** III. Blacker

Laboratory-discussion—3 hours. Prerequisite: approval by Committee on Student Evaluation and Promotion. Introduction to concepts and clinical applications of psychiatry throughout the human life cycle. Includes tutorials tailored to individual student interests which will explore the biological, psychological, social, and cultural factors influencing health and illness. Includes lecture and video presentations as well as group discussion.

**402. Human Sexuality (1.5)** IV. Blacker

Lecture—18 hours total; discussion—2 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Normal and variant human sexuality. The focus will be on understanding human sexual function in health and illness.

**403. Psychopathology (3)** II. Maddock and staff

Lecture—24 hours total; laboratory—20 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Introduction to basic aspects in mental/emotional dysfunction. Focus on understanding the development and symptomatology of major forms of psychiatric dysfunction.

**412. Psychiatry Grand Rounds (1)** II, III, IV. Grindlinger and staff

Lecture—1 hour. Prerequisite: medical students or staff or other qualified mental health professionals with consent of instructor. Weekly conference at UCD Medical Center for presentation of selected clinical cases, presentation of lecture and research reports.

**413. Outpatient Psychiatry Clerkship (6-12)** I, II, III, IV. Grindlinger and staff

Clinical experience—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Clinical management of adult outpatients, including initial evaluation, differential diagnosis, and treatment planning, in addition to brief psychotherapy and interviewing skills. Conferences, medication clinics, and videotaping under supervision.

**414. Consultation-Liaison Clerkship (6-12) I, II, III, IV.**

Grindlinger and staff

Clinical experience—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Student functions as member of the team in evaluation, management, and psychiatric liaison with other medical specialties. Intensive supervision from senior staff and psychiatric residents.

**415. Psychiatric Emergency Clerkship (6) I, II, III, IV.**

Grindlinger

Clinical experience—32 hours; lecture-conference—8 hours. Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. Outpatient care; conferences/lectures. Evaluation and treatment (under supervision) of patients at UCD Medical Center Psychiatry Emergency Services and affiliated hospitals. Participation in usual clinical activities of Emergency/Psychiatry Emergency Services.

**416. Child Psychiatry Clerkship (6-12) I, II, III, IV.**

Grindlinger and staff

Clinical experience—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) 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.

**417. Jail Psychiatric Clerkship (6 or 12) I, II, III, IV.**

Grindlinger and staff

Clinical experience—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) 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.

**418. Off-Campus Clinical Experience (6-12) I, II, III, IV.**

Grindlinger and staff

Clinical activity—full time (4 to 8 weeks). Prerequisite: fourth-year medical students; consent of instructor. Clinical or research elective in off-campus medical school or mental health setting. To be arranged with advanced approval of instructor and individual in charge of off-campus setting.

**419. Readings in Freud (1) II, III.**

Weinstein

Seminar—five 2-hour sessions. Prerequisite: medical student, psychiatric residents, clinical psychology graduate students,† or consent of instructor. Emphasis on Freud's theoretical works with discussion of Freud's assumptions and statements of his development of psychoanalysis will be described and clarified. (S/U grading only, for all students other than medical students.)

**420. Acting Internship in Psychiatry (6 or 12) I, II, III, IV.**

Grindlinger and staff

Clinical experience—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of course coordinator. Acting intern position on the UCD Medical Center Inpatient Unit. Close faculty supervision with emphasis on biological psychiatry, psychopharmacology and psychodynamic aspects appropriate to diagnostic and long-term patient management.

**421. Advanced Psychiatry Clerkship: Martinez VA Hospital (6-12) I, II, III, IV.**

Grindlinger and staff

Clinical activity—full time (4 to 8 weeks). Prerequisite: Medical Sciences 433 (Psychiatry Core Clerkship) and/or consent of instructor. The student with the staff psychiatrist's supervision is assigned patients for psychiatric examination, evaluations, or treatment needs, and follows patients from admission to discharge. The student will become familiar with psychiatric diagnosis, medications, and treatment modalities and in group and structured milieu.

**422. Readings in Psychiatry (1-3) I, II, III, IV.**

Grindlinger and staff

Readings-discussion—3 to 9 hours. Independent reading of a selected topic in psychiatry. Supervision and discussion with a psychiatry faculty member. (S/U grading only.)

**480. Insights in Psychiatry (1-3) I, II, III, IV.**

Grindlinger

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. (S/U grading only.)

**\*498. Directed Group Study (1-5) I, II, III, IV.**

Blacker

and staff

Prerequisite: consent of instructor.† Medical students desiring to explore particular topics in depth. (S/U grading only for graduate or medical students.)

**499. Research (1-12) I, II, III, IV.**

Grindlinger and staff

Prerequisite: consent of instructor.† Individual research on selected topics or research projects. (S/U grading only for graduate or medical students.)

**Radiology—Diagnostic****Professional Courses****400. Correlative Human Radiologic Anatomy (1) I.**

Link and staff

Lecture—10 hours total. Prerequisite: consent by Committee on Student Evaluation and Promotion. Provides students with an overview of the anatomic structure of the human body from a radiologic aspect.

**413. Radiological Diagnosis II (Physics of Diagnostic Radiology) (5) I.**

Seibert, Leidholdt

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. Offered at VA Hospital, Martinez. Offered in odd-numbered years. (S/U grading only.)

**414. Medical Radiation Biology (3) III.**

Bushberg

Leidholdt

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 at VA Hospital, Martinez. Offered in even numbered years only. (S/U grading only.)

**\*415. Radiopharmacy (3) III.**

Vera

Lecture—3 hours. Prerequisite: consent of instructor. Fundamentals of radiopharmaceutical science including radiochemistry; radiopharmaceutical production; theory; applications; mechanisms of localization, radionuclides and radiopharmaceutical drug applications and related regulatory aspects. Offered in odd-numbered years. (S/U grading only.)

**420. Radiologic Diagnosis I (1) II.**

Ablin

Lecture—1 hour. Prerequisite: second-year medical students. Development of skills needed for interpretation of radiographs. Emphasis on logical sequence for film reading, and on alternative radiologic procedures available to the modern physician. Gastrointestinal, respiratory and central nervous systems and CT. (S/U grading only.)

**421. Radiologic Diagnosis II (1) III.**

Ablin

Lecture—1 hour. Prerequisite: second-year medical students. Development of skills needed for interpretation of radiographs. Emphasis on logical sequence of film reading, and on alternative radiologic procedures available to the modern physician. Cardiovascular, genitourinary, and osseous systems including the use of diagnostic ultrasound in cardiac, obstetric, and gynecologic diagnosis. (S/U grading only.)

**461. Clinical Clerkship in Diagnostic Radiology**

(1-18) I, II, III, IV.

Link

Clinical activity—full time (3 days per unit). Prerequisite: completion of third year of Medical School; consent of instructor. Student works with radiologists at UCD Medical Center in film reading sessions and radiological procedures; includes fluoroscopy, vas-

cular radiology and special investigations. Includes daily individual teaching sessions with faculty radiologists, radiology learning laboratory, and all- radiology conferences and seminars. Limited enrollment.

**498. Group Study in Diagnostic Radiology (1-12) I, II, III, IV.**

The Staff

Prerequisite: consent of instructor. (S/U grading only.)

**499. Research in Diagnostic Radiology (1-12) I, II, III, IV.**

The Staff

Prerequisite: consent of instructor.† (S/U grading only for medical students.)

**Radiology—Nuclear Medicine****Upper Division Courses****101. Biomedical Radiochemistry (3) III.**

The Staff

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Course is designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and vigorous lecture-laboratory experience in biomedical nuclear chemistry. Subjects include choice and purification of appropriate gamma and beta radioisotopes, compounding biological pharmacodynamics and radioimmunoassay. (Same course as 401.)

**198. Directed Group Study (1-5) I, II, III, IV.**

The Staff (S. DeNardo in charge)

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates**

(1-5) I, II, III, IV.

The Staff (Stadnalik in charge)

Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

**Graduate Course****299. Research: Special Study for Graduate Students (1-12) I, II, III, IV.**

The Staff (Director in charge)

Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

**Professional Courses****401. Biomedical Radiochemistry (3) III.**

The Staff

Lecture—2 hours; laboratory—3 hours. Prerequisite: open to graduate† and medical students; consent of instructor. Course is designed to combine basic nuclear physics, chemistry, and biology into a comprehensive and vigorous lecture-laboratory experience in biomedical nuclear chemistry. Subjects include choice and purification of appropriate gamma and beta radioisotopes, compounding biological pharmacodynamics and radioimmunoassay. (Same course as 101.)

**411. Radiological Physics I (Physics of Nuclear Medicine) (5) I.**

Bushberg, Leidholdt, Macey, Vera

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 VA Hospital, Martinez. Offered in even-numbered years. (S/U grading only.)

**463. Clinical Clerkship in Nuclear Medicine (9 or 18) I, II, III, IV.**

Stadnalik

Clinical activity—full time (3 days per unit). Prerequisite: satisfactory completion of second year of Medical School or the equivalent; consent of instructor. Clerkship correlates radioisotopic methods with clinical, pathophysiology, 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. Limited enrollment with preference to students enrolling for 18 units.

**498. Group Study in Nuclear Medicine (1-12) I, II, III, IV.**

The Staff (Stadnalik in charge)

Prerequisite: consent of instructor.† (S/U grading only for medical students.)

**499. Research in Nuclear Medicine** (1-12) I, II, III, IV. The Staff (Stadnik in charge)  
Prerequisite: consent of instructor.† (S/U grading only for medical students.)

## Radiology—Therapeutic

### Graduate Course

**299. Independent Study and Research** (1-12) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: enrollment with Biophysics Group for Ph.D. candidacy, and consent of group adviser and sponsor. (S/U grading only.)

### Professional Courses

#### \*464. Clinical Clerkship in Therapeutic Radiology

(1.5-9) I, II, III, IV.  
Clinical experience—full time (1-6 weeks). Prerequisite: completion of third year of medical school; consent of instructor. Clinical oncology experience. Student participates in daily treatment planning conferences where all new cases are discussed with whole faculty of therapeutic radiology. Interviews and examines patients for presentation to staff, and reports on selected reading relevant to cases seen. Limited enrollment.

#### 498. Group Study in Therapeutic Radiology

(1-12) I, II, III, IV. The Staff.  
Prerequisite: consent of instructor.† (S/U grading only for medical students.)

#### 499. Research in Therapeutic Radiology

(1-12) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor.† (S/U grading only for medical students.)

## Surgery

### Upper Division Courses

#### 192. Internship in General Surgery

(1-12) I, II, III; IV. The Staff  
Work-learn experience—3-36 hours. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work-study experience in general surgery and related fields. (P/NP grading only.)

**199. Special Study in General Surgery for Advanced Undergraduates** (1-5) I, II, III, IV. The Staff  
Prerequisite: advanced undergraduate student with consent of instructor. (P/NP grading only.)

### Graduate Course

**299. Research** (1-12) I, II, III, IV. Wolfe in charge  
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

### Professional Courses

#### 419. Introduction to Clinical Surgery

(1-6) I, II, III, IV. Ward  
Clinical activity—full time. Prerequisite: second-year medical student with consent of instructor. Designed to introduce medical students to basic principles of surgical practice and the most common surgical diseases. Course will afford opportunity to review surgical patients and discuss them with members of staff.

#### 460. Clinical Surgical Elective

(3-9) I, II, III, IV. The Staff  
Clinical experience—full time (2 to 6 weeks). Prerequisite: fourth-year medical student or third-year medical student with completion of Medical Sciences 430. Preparation of patients, treatment, operative care, and postoperative follow-up. Services include Surgery Clinics, Surgical Nutrition, Pediatric Surgery, Cardiothoracic Surgery, Gastrointestinal Surgery, and Burn Clinic.

#### 461. Surgery Burn Unit Clerkship

(6 or 9) I, II, III, IV. The Staff  
Clinical instruction—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Student functions as an extern in the eight-bed Burn Unit; learns principles of critical care, fluid and electrolyte resuscitation and management of surgical wounds.

#### 462. Surgery Trauma Service Clerkship

(6 or 9) I, II, III, IV. Blaisdell and staff  
Clinical instruction—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. 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.

#### 463. Surgery Intensive Care Unit

(6 or 9) I, II, III, IV. Holcroft and staff  
Clinical instruction—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. 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.

#### 464. General Surgery Clerkship: Kaiser Hospital

(6 or 9) I, II, III, IV. The Staff  
Clinical instruction—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Student participates with University residents on the teaching services at Kaiser Hospital, Sacramento. Opportunity to see larger number of practical, general surgical problems and participate in their care.

#### 465. General Surgery Clerkship: Martinez VA Hospital

(6, 9, or 12) I, II, III, IV. Guernsey, Ward  
Clinical instruction—full time (4, 6, or 8 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Part of the General Surgery residency training program with the University of California, Davis. The Martinez rotation has a large number of gastrointestinal and vascular surgical problems as well as broad surgical experience.

#### 466. General Surgery Clerkship: Travis AF Base Hospital

(6 or 9) I, II, III, IV. Gillmore, Ward  
Clinical instruction—full time (4 or 6 weeks). Prerequisite: fourth-year medical student, or third-year medical student with completion of Medical Sciences 430. Opportunity to participate on the surgical service of our affiliated Air Force Hospital. The program has a large number of general surgery problems and provides a broad clinical experience in surgery.

#### 467. Surgical Oncology

(3-9) I, II, III, IV. Goodnight and staff  
Clinical instruction—full time (2 to 6 weeks). Prerequisite: fourth-year medical student or third-year medical student with completion of Medical Sciences 430. Student learns medical and surgical principles applicable to cancer. Participation in the care and major surgical oncologic problems; and opportunity to learn the medical, radiologic, and surgical approaches to cancer therapy.

#### 468. Cardiothoracic Surgery Clerkship

(6-9) I, II, III, IV. Benfield  
Variable clinical experience—full time (4 to 6 weeks). Prerequisite: fourth-year medical student or third-year medical student with completion of Medical Sciences 430. 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.

#### 478. Surgical Preceptorship: Off Campus

(6-18) I, II, III, IV. Ward  
Clinical activity—full time. Prerequisite: fourth-year medical student and consent of instructor. Student participates in the preoperative, operative and postoperative care of surgical patients under the supervision of attending staff.

#### 480. Insights in Surgery

(1-3) I, II, III, IV. The Staff  
Clinical experience—3 to 9 hours. Prerequisite: 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. (S/U grading only.)

#### 494H. Fourth-Year Surgical Honors Program

(1) I, II, III, IV. Wolfman  
Prerequisite: completion of third year of Medical School with superior performance on Medical Sciences 430; consent of instructor. To provide intensive and comprehensive training in surgery to students interested in postgraduate surgical career, that would enable them to succeed during the internship and residency training. (S/U grading only.)

#### 498. Group Study

(1-5) I, II, III, IV. Wolfman  
Prerequisite: medical student; consent of instructor. Directed reading and discussion and/or laboratory investigation on selected topics.

#### 499. Laboratory Research

(1-12) I, II, III, IV. Ward and staff  
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. (S/U grading only.)

## Urology

### Lower Division Course

**99. Special Study for Undergraduates** (1-5) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Course

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III, IV. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Course

**299. Research in Urology** (1-12) I, II, III, IV. Deitch, deVere White in charge  
Prerequisite: graduate standing and consent of instructor. (S/U grading only.)

### Professional Courses

**400. Office Urology** (1) I, II, III, IV. deVere, White  
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.

#### 420. Urinary System

(3.5) III. Stone, Bogusky  
Lecture—24 hours, discussion—18 hours, and laboratory 10 hours (52 hours total). Prerequisite: approval by Committee on Student Evaluation and Promotion. Fundamental aspects of (a) disorders of body water, electrolytes and acid/base balance; (b) major categories and mechanisms of parenchymal renal diseases; (c) major congenital and acquired urologic diseases; (d) urinary tract infections. (Same course as Internal Medicine 420E.)

#### 460. Urology Clinical Clerkship

(5-18) IV, I, II, III, IV. deVere, White  
Clinical activity—full time. Prerequisite: second-year medical student; physical diagnosis or the equivalent; consent of instructor. 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. Limited enrollment.

#### 461. Externship in Urology

(5-18) I, II, III, IV. deVere, White  
Clinical activity—full time. Prerequisite: fourth-year medical students with 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.

**465. Surgical Team Participation: Martinez VA Medical Center** (6 or 12) I, II, III, IV. Merrill

Clinical clerkship—full time (4 or 8 weeks); lecture—varied. Prerequisite: third- or fourth-year medical student; Medical Sciences 430. Students will participate in care of assigned patients on a busy urology inpatient service and outpatient clinic. Clerkship provides exposure to urologic procedures performed in operating room and cystoscopic suite under supervision of Urology staff physicians.

**499. Research In Urology** (1-12) I, II, III, IV. Deitch, DeVere White, E.L. Lewis, Palmer, Stone

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.

**Medicine**

(School of Veterinary Medicine)

Anthony A. Stannard, D.V.M., Ph.D., Chairperson of the Department

Department Office, 2102 Medical Science 1A (916-752-1363)

**Faculty**

Alexander A. Ardans, D.V.M., M.S., Professor

Jeffrey E. Barlough, D.V.M., Ph.D., Assistant Research Virologist

Dale L. Brooks, D.V.M., Ph.D., Lecturer

Gary P. Carlson, D.V.M., Ph.D., Professor

Larry D. Cowgill, D.V.M., Ph.D., Associate Professor

Nancy E. East, M.S., D.V.M., M.P.V.M., Assistant Professor

Pamela H. Eisele, D.V.M., Assistant Clinical Professor

Laurence R. Enos, Pharm.D., Lecturer

Murray E. Fowler, D.V.M., Professor

John M. Gay, D.V.M., Ph.D., Assistant Professor

Jeanne W. George, D.V.M., Ph.D., Assistant Research Clinical Pathologist

Lisle W. George, D.V.M., Ph.D., Associate Professor

Ronald P. Hedrick, Ph.D., Associate Professor

Roy V. Henrickson, D.V.M., Adjunct Lecturer

David E. Hinton, Ph.D., Professor

Charles A. Hjerpe, D.V.M., Professor

Peter J. Ihrke, V.M.D., Professor

Mark D. Kittleson, D.V.M., M.S., Ph.D., Associate Professor

Gerald V. Ling, D.V.M., Professor

Donald G. Low, D.V.M., Ph.D., Professor

John P. Maas, D.V.M., M.S., Assistant Professor of Clinical Diagnostic Medicine (*California Veterinary Diagnostic Laboratory*)

John Madigan, M.S., D.V.M., Assistant Professor

Richard W. Nelson, D.V.M., Assistant Professor

Jack Nunberg, Ph.D., Research Associate

Niels C. Pedersen, D.V.M., Ph.D., Professor

William R. Pritchard, D.V.M., Ph.D., J.D., Professor

Livo G. Reggi, D.V.M., Ph.D., Professor Emeritus

Edward C. Ramsay, D.V.M., Lecturer

Edward A. Rhode, D.V.M., Professor

Jeffrey A. Roberts, D.V.M., Assistant Clinical Professor

Bradford P. Smith, D.V.M., Professor

Michael S. Spensley, D.V.M., Research Associate

Sharon J. Spier, D.V.M., Ph.D., Assistant Professor

Anthony A. Stannard, D.V.M., Ph.D., Professor (*Medicine, Pathology*)

Donald R. Strombeck, D.V.M., Ph.D., Professor

William P. Thomas, D.V.M., Associate Professor

Mark C. Thurmond, D.V.M., M.P.V.M., Ph.D., Associate Professor

Michael Torten, D.V.M., Ph.D., Visiting Professor

Leon D. Weaver, V.M.D., Senior Lecturer

James F. Wilson, D.V.M., J.D., Lecturer

W. David Wilson, B.V.M.S., M.R.C.V.S., Associate Professor

William W. Wingfield, M.S., Ph.D., Assistant Adjunct Professor

Janet Yamamoto, Ph.D., Assistant Research Immunologist

**Courses in Medicine****Upper Division Course****199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses****290. Seminar in Veterinary Medicine** (1) I, II, III. The Staff (Chairperson in charge)**298. Group Study** (1-5) I, II, III. The Staff

Prerequisite: student in School of Veterinary Medicine or consent of instructor. Group study in selected areas of the clinical sciences. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

**Professional Courses****401. Small Animal Clinics** (1 1/2 per week) I, II, III. The Staff (Ling in charge)

Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Resident responsible for diagnoses, medical and surgical treatment of animals in the wards and outpatient clinic, including history taking, physical examinations, laboratory tests, special diagnostic and therapeutic procedures, and consultations, under the direction of the senior staff. May be repeated for credit. (S/U grading only.)

**402. Large Animal Medicine** (1 1/2 per week) I, II, III. The Staff (Smith in charge)

Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for the medical care of patients in the VM Teaching Hospital and outpatient clinics under the direction of the senior staff of the hospital. May be repeated for credit. (S/U grading only.)

**403. Small Animal Medicine** (1 1/2 per week) I, II, III. The Staff (Ling in charge)

Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for the medical care of animals in the wards and outpatient clinic including physical examinations, history taking, laboratory tests, and consultations under the supervision of the senior staff. May be repeated for credit. (S/U grading only.)

**404. Herd Health Management** (1 1/2 per week) I, II, III. Hjerpe in charge

Laboratory—50 hours total. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents apply their knowledge of veterinary medicine, animal nutrition, genetics, husbandry, management, and economics on a herd basis toward the improvement of food animal production efficiency through control and prevention of disease. (S/U grading only.)

**421. Veterinary Dermatology** (3/4 per week) I, II, III. Stannard

Laboratory—25 hours. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents are responsible for patient care in the hospital and outpatient clinic including history taking, physical examinations, and diagnostic procedures under the direction of the staff dermatologist. (S/U grading only.)

**\*423. Pulmonary Diseases** (3/4 per week) I, II, III. Amis

Laboratory—25 hours. Prerequisite: professional standing intern in Veterinary Medical Teaching Hospital, or consent of instructor. New and advanced techniques for the detection and characterization of respiratory and cardiac diseases in animals demonstrated and discussed. Interns assist in assessment of respi-

ratory dysfunction of patients and correlation of the dysfunction and clinical signs. (S/U grading only.)

**425. Zoo and Wildlife Medicine** (3/4 per week) I, II, III. Fowler

Laboratory—25 hours. Prerequisite: professional standing, resident in Veterinary Medical Teaching Hospital, or consent of instructor. Residents responsible for assisting in handling and treatment of clinic cases and for learning the techniques of manual and chemical restraint of a wide variety of mammals, birds, reptiles, and fish. Medication problems, anesthetic techniques, and surgical procedures will be discussed and practiced. (S/U grading only.)

**491. Small Animal Grand Rounds** (1/2) I, II, III. The Staff (Ling in charge)

Discussion—1 hour. Prerequisite: professional standing, intern, or resident in Veterinary Medical Teaching Hospital or consent of instructor. Residents take an active part in the presentation and discussion of selected cases from the small animal clinic. May be repeated for credit. (S/U grading only.)

**492. Large Animal Grand Rounds** (1/2) I, II, III. The Staff (Carlson in charge)

Discussion—1 hour. Prerequisite: professional standing as resident in Veterinary Medical Teaching Hospital or consent of instructor. Residents take an active part in the presentation and discussion of selected cases from the large animal and ambulatory clinics. May be repeated for credit. (S/U grading only.)

**493. Seminar in Veterinary Medicine** (1) I, II, III. The Staff (Cowgill and Smith in charge)

Seminar—2 hours. Prerequisite: professional standing; resident in Veterinary Medical Teaching Hospital. Seminars given by the faculty of the School of Veterinary Medicine in topics relating directly to the practice of clinical medicine and surgery. Residents will assist in the presentation of seminar material. May be repeated for credit. (S/U grading only.)

**Medieval Studies**

(College of Letters and Science)

1 Dennis J. Dutschke, Ph.D., Program Director

Program Office, 922 Sproul Hall (916-752-1219)

**Committee in Charge**Samuel G. Armistead, Ph.D. (*Spanish*)1 Dennis J. Dutschke, Ph.D. (*Italian*)Ingeborg Henderson, Ph.D. (*German*)1 Winder McConnell, Ph.D. (*German*)David A. Nuter, Ph.D. (*Music*)Marijane Osborn, Ph.D. (*English*)**The Major Program**

The major in Medieval Studies is designed to introduce students to the main features of European civilization during the period from the fall of Rome to the beginnings of the Renaissance. Medieval studies are inherently interdisciplinary. The program involves studies in history, art, philosophy, literature, drama, music, national languages, religion, rhetoric, and political theory.

**A.B. Major Requirements:**

UNITS

**Preparatory Subject Matter**

Recommended: Art 1B, History 4A, Philosophy 21, Medieval Studies 20A, 20B, 20C, Religious Studies 10.

Language proficiency is a necessity; courses in Latin and other European languages are strongly recommended, particularly for students planning to pursue graduate studies in the medieval field.

**Depth Subject Matter** ..... 52

History, at least 12 units from History 102B, 121A, 121B, 121C, 201B ..... 12

Literature: at least 16 units, including two courses from each of two of the following .....16  
 (a) English 111, 113A, 113B, 150A, 188, 189.  
 (b) French 115, 141.  
 (c) German 120, 122.  
 (d) Italian 113, 115A, 115B, 139B, 140.  
 (e) Latin 101, 102, 103, 104, 105, 106, 108, 109, 111A, 111B, 111C, 112, 114, 115, 116.

Philosophy and religion, at least 8 units from Philosophy 105, 132, 145, 146, 190; Religious Studies 102, 110 .....8

Arts and language, at least 8 units from Art 176A, 176B, 176C, 177A, 178A, 178B; Dramatic Art 156, German 106; Music 121 (note prerequisite), 199; Rhetoric and Communication 110, 111 .....8

Political thought, at least one course from Political Science 115, 116, 118A .....4

Senior thesis, Medieval Studies 190 .....4

**Total Units for the Major** .....52

**Major Advisers.** D. J. Dutschke (*Italian*), W. McConnell (*German*), J. J. Murphy (*Rhetoric*), M. Osborn (*English*).

## Minor Program Requirements:

UNITS

**Medieval Studies** .....24

The minor in Medieval Studies is designed to be a coherent program of interdisciplinary study. Medieval Studies units may be taken in one or more of the traditional fields of concentration, including art, drama, history, literature, music, national languages, philosophy, political theory, religious studies and rhetoric. Courses must be upper division and chosen from at least two of these subject areas, and they must be within the three periods of Early Medieval Culture, culture of the High Middle Ages, and Medieval transformations. Students may also select a minor with a thematic emphasis.

There is no foreign language requirement for the minor, although knowledge of Latin or a romance language is recommended.

The minor must be designed in consultation with a Department Adviser.

**Minor Advisers.** D. J. Dutschke (*Italian*), W. McConnell (*German*), J. J. Murphy (*Rhetoric*), M. Osborn (*English*).

## Courses in Medieval Studies

### Lower Division Courses

**20A. Early Medieval Culture** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Readings (in translation) in early medieval culture, such as the *Codes of Justinian*, the *Confessions of Saint Augustine*, *The Consolation of Philosophy* of Boethius, *Beowulf*, the *Nibelungenlied*, and the *Song of Roland*. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Art 1B, History 4A, or Comparative Literature 1 or 2.

**20B. The Culture of the High Middle Ages** (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Readings (in translation) in the culture of the high Middle Ages, such as the *Summa Theologica* of Thomas Aquinas, the *Chronicles* of Froissart, *The Canterbury Tales* of Chaucer, and the *Divine Comedy* of Dante. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Art 1B, History 4A, or Comparative Literature 1 or 2.

**20C. Medieval Transformations** (4) III. The Staff

Lecture—2 hours; discussion—1 hour; paper or formal presentation. Course deals with the great medieval transformations that took place before the Renaissance. Topics will be selected from various disciplines, such as literature, philosophy, religion, history, art, music, political thought, rhetoric, and

other pertinent fields. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Art 1B, History 4A, or Comparative Literature 1 or 2.

**98. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

### Upper Division Courses

**120A-F. The Medieval World** (4) I, II, III. The Staff (Chairperson in charge)

Lecture—2 hours; discussion—1 hour; term paper. Course deals with selected themes from the Middle Ages; the Fall of Rome to the beginning of the Renaissance. Subjects will vary from year to year and cover such topics as

- \*(A) The Monastic Orders;
- \*(B) Origins of Universities;
- \*(C) The Seven Liberal Arts, and their Significance in the Middle Ages;
- \*(D) Family and Society;
- (E) Chivalry; and
- \*(F) Church and State.

General Education credit for course 120E: Civilization and Culture/Non-Introductory. Recommended GE preparation: Medieval Studies 20A, 20B, or 20C, or English 3.

**190. Senior Thesis** (4) I, II, III. The Staff

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.

**197T. Tutoring in Medieval Studies** (1-4) II, III. The Staff (Chairperson in charge)

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) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

## Microbiology

(College of Letters and Science)

Mark L. Wheelis, Ph.D., Acting Chairperson of the Department  
Department Office, 156 Hutchison Hall  
(916-752-0262)

### Faculty

Stanley W. Artz, Ph.D., Associate Professor  
Paul Baumann, Ph.D., Professor  
Robert E. Hungate, Ph.D., Professor Emeritus  
John L. Ingraham, Ph.D., Professor Emeritus  
Daniel J. Klionsky, Ph.D., Assistant Professor  
JaRue S. Manning, Ph.D., Professor  
Allen G. Marr, Ph.D., Professor  
John C. Meeks, Ph.D., Professor  
Douglas C. Nelson, Ph.D., Associate Professor  
Herman J. Phaff, Ph.D., Professor Emeritus (*Food Science and Technology*)  
Wiltraud J.C. Pfeiffer, Ph.D., Senior Lecturer (*Microbiology, Biological Sciences*)  
David Pratt, Ph.D., Professor Emeritus  
Martin L. Privalsky, Ph.D., Associate Professor  
Mark L. Wheelis, Ph.D., Senior Lecturer

## The Major Programs

Both undergraduate major programs provide a balance of studies in microbiology, with appropriate courses in mathematics and physical sciences. The A.B. program emphasizes the biology of bacteria, while the B.S. program includes more biochemistry and related course work. Either program, with judicious course selection, is appropriate for students contemplating a career in medicine, various allied health professions including medical technology, or teaching. The B.S. program is especially well suited for students who want a professional career in microbiology, or who wish to pursue graduate education in a biological science discipline. The choice of a major program and its suitability for particular career options should be discussed with a major adviser.

Students majoring in Microbiology in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

**Choice of College.** The Bachelor of Arts degree is offered only by the College of Letters and Science. The Bachelor of Science degree is offered by both the College of Letters and Science and the College of Agricultural and Environmental Sciences.

### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>47-60</b>
Biological Sciences 1A, 1B, 1C .....	15
Chemistry 1A, 1B .....	10
Chemistry 8A, 8B or 128A, 128B, 128C, 129A .....	6-11
Statistics 13 .....	4
Mathematics 16A-16B or 21A-21B .....	6-8
Physics 1A, 1B, or 5A, 5B, 5C .....	6-12
<b>Depth Subject Matter</b> .....	<b>38-40</b>
Microbiology 102, 102L, 105, 130A .....	14
Two of the following: Microbiology 110, 110L, 120-120L, 130B-130L, 177-177L .....	10-11
Biochemistry 101A, 101B .....	6
Microbiology 162 or Veterinary Microbiology 128 .....	3-4
Additional units from: Microbiology 110, 110L, 120, 120L, 130B, 130L, 177, 177L; Biochemistry 101L; Botany 114, 118, 119; Veterinary Microbiology 126, 127 .....	5
<b>Total Units for the Major</b> .....	<b>85-100</b>

NOTE: For key to footnote symbols, see page 133.

**B.S. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter .....</b>	<b>61-73</b>
Biological Sciences 1A, 1B, 1C .....	15
Chemistry 1A, 1B, 1C, 5 or 4A, 4B, 4C.....	15-19
Chemistry 8A, 8B or 128A, 128B, 128C, 129A.....	6-11
Statistics 13 .....	4
Mathematics 16A, 16B, 16C or 21A, 21B, 21C.....	9-12
Physics 5A, 5B, 5C.....	12
<b>Depth Subject Matter .....</b>	<b>46-48</b>
Microbiology 102, 102L, 105, 130A .....	14
One of the following: Microbiology 110-110L, 120-120L, 130B-130L, 177-177L.....	5-6
Microbiology 162 or Veterinary Microbiology 128 .....	3-4
Biochemistry 101A, 101B, 101L.....	12
Genetics 100 .....	4
Veterinary Microbiology 126.....	3
Additional units from: Microbiology 110, 110L, 120, 120L, 130B, 130L, 177, 177L; Veterinary Microbiology 127 .....	5
Recommended: Chemistry 107A, 107B, 108; a course in computer programming.	
<b>Total Units for the Major .....</b>	<b>107-121</b>

**Breadth Subject Matter**

<i>College of Agricultural and Environmental Sciences students.....</i>	<i>24</i>
English and/or rhetoric .....	8
Social sciences and/or humanities .....	16

See also the College section for additional requirements.

*College of Letters and Science students:*

Refer to the College section for a description of requirements to be completed in addition to the major.

**Major Advisers.** A.G. Marr, W.J.C. Pfeiffer, M.L. Wheelis.

**Honors and Honors Program.** Contact a major adviser from those listed above.

**Teaching Credential Subject Representative.** W.J.C. Pfeiffer. See also the Teacher Education Program.

**Graduate Study.** The Graduate Group in Microbiology offers programs of study and research leading to the M.S. and Ph.D. degrees in microbiology. The offerings of the Department of Microbiology are augmented by courses and faculty of the Departments of Biochemistry and Biophysics, Botany, Food Science and Technology, Genetics, Land, Air, and Water Resources, Plant Pathology, Viticulture and Enology, and the Schools of Medicine and of Veterinary Medicine. For detailed information regarding graduate study in microbiology, address the Chairperson, Graduate Group in Microbiology, Department of Microbiology.

**Related Courses.** For other courses related to Microbiology see course offerings in the Division of Biological Sciences and Departments of Botany, Epidemiology and Preventive Medicine, Food Science and Technology, Land, Air, and Water Resources, Medical Microbiology, Plant Pathology, and Veterinary Microbiology.

Faculty of the Department of Microbiology also teach or participate in the following courses: Biological Sciences 1A, 10 and 19.

**Courses in Microbiology****Lower Division Courses****2. General Bacteriology (3) I, II. The Staff**

Lecture—3 hours. Prerequisite: Biological Sciences 1 or 1A. The biology of bacteria with some of its applications. Not open for credit to students who have completed course 102.

**3. Bacteriological Laboratory Techniques (1) I, II.**

The Staff

Laboratory—3 hours. Prerequisite: Chemistry 1A. Designed to acquaint student with basic techniques of bacteriology, with major responsibility for organizing and accomplishing work resting with student. (P/NP grading only.)

**20. Biology of Microorganisms (4) III. The Staff**

Lecture—3 hours; term paper. Prerequisite: Biological Sciences 10. Survey of the diversity of microorganisms (viruses, bacteria, protists), their metabolism, genetics, and habitats. Emphasis on importance to humans — role of microorganisms in global element cycles, in food production, and in disease. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10.

**98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

**Upper Division Courses****102. General Bacteriology (4) I. Baumann; III. Marr**

Lecture—4 hours. Prerequisite: Biological Sciences 1 or 1A and Chemistry 8B (may be taken concurrently). Survey of the biology of bacteria and viruses, including bacterial structure, metabolism, physiology, genetics, and evolution; viral structure and replication; the role of bacteria in global element cycles; and the role of microbes in infectious disease. Only two units of credit allowed to students who have previously passed course 2.

**102L. General Bacteriology Laboratory (2) I, III.**

Pfeiffer

Laboratory—6 hours. Prerequisite: course 102 (may be taken concurrently). Introduction to principles and laboratory methods employed in working with microorganisms. For students planning to continue study of microbiology, or use microorganisms as tools for study of genetics and biochemistry. Only one unit of credit allowed if course 3 has been taken.

**105. Bacterial Diversity (5) II. Nelson**

Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 102, 102L, and Biochemistry 101A; Biochemistry 101B recommended. Survey of the major groups of bacteria emphasizing diversity of energy metabolism, morphology and natural history. Includes methods for determination of evolutionary relationships among groups. Isolation and characterization of bacterial strains from various habitats.

**110. Bacteriology of Insects (3) II. Baumann**

Lecture—3 hours. Prerequisite: course 2 or 102; Biochemistry 101A or Physiological Sciences 101A. Physiological basis of pathogenic and symbiotic associations between prokaryotes and insects. Taxonomy, physiology, pathogenesis and molecular biology of insect pathogens. Insect immunity. Nutritional associations between microorganisms and insects. Pertinent entomological background information will be included in the lectures.

**110L. Bacteriology of Insects Laboratory (2) II.**

Baumann

Laboratory—6 hours. Prerequisite: course 3 or 102L, and 110 (may be taken concurrently). Practical experience in the isolation, cultivation, physiology, genetics and taxonomy of selected insect pathogens. Bioassay of toxins and observations on the mechanisms of pathogenesis. Offered in odd-numbered years.

**120. Microbial Ecology (3) III. Meeks**

Lecture—3 hours. Prerequisite: course 105; Biochemistry 101A. 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.

**120L. Microbial Ecology Laboratory (2) III. Meeks**

Laboratory—6 hours; one optional overnight weekend field trip. Prerequisite: course 120 (may be taken concurrently); consent of instructor. Study of prokaryotic microorganisms from certain habitats. One-half of laboratory effort will consist of organized experi-

ments on ecologically important microbial activities. For remaining one-half, research projects will be done on student selected specific habitats of microorganisms. Limited enrollment.

**130A. Bacterial Physiology and Genetics (3) II.**

The Staff

Lecture—3 hours. Prerequisite: course 2 or 102; Biochemistry 101B (may be taken concurrently); Mathematics 16A. Physiology and regulation of bacterial growth including the effect of the environment. Mapping techniques and use of mutants in problem solving.

**130B. Bacterial Physiology and Genetics (3) III.**

Artz

Lecture—3 hours. Prerequisite: course 130A. Gene regulation. Prokaryotic nitrogen metabolism. Structure and function of the bacterial cell envelope; synthesis of peptidoglycan and lipopolysaccharide; active transport of nutrients; chemotaxis.

**130L. Bacterial Physiology Laboratory (3) III. Artz**

Laboratory—9 hours. Prerequisite: course 130A and either course 3 or 102L. Physiology and genetics of bacteria and bacterial viruses. Isolation and characterization of mutant strains. Mapping of mutations by conjugation and transduction. Studies on control of enzyme synthesis by induction, repression and catabolic repression.

**162. General Virology (4) I. Manning**

Lecture—4 hours. Prerequisite: Biological Sciences 1A and Biochemistry 101A. Integrated presentation of the nature of animal, bacterial, and plant viruses, including their structure, replication and genetics.

**177. Metabolism of Anaerobic Bacteria (3) II. Macy (Animal Science)**

Lecture—3 hours. Prerequisite: course 2 or 102; Biochemistry 101B (may be taken concurrently). Various groups of anaerobic and facultatively anaerobic bacteria, a consideration of their natural environments and their metabolic characteristics, with emphasis on energy yielding catabolic pathways.

**\*177L. Laboratory in Metabolism of Anaerobic Bacteria (2) II. Macy (Animal Science)**

Laboratory—6 hours. Prerequisite: course 3 or 102L; course 177 (may be taken concurrently). Isolation of anaerobic bacteria from a number of different natural environments; experiments dealing with certain characteristic physiological and metabolic aspects of anaerobic bacteria. Offered in even-numbered years.

**190C. Undergraduate Research Conference (1) I, II, III. The Staff (Chairperson in charge)**

Discussion/conference—1 hour. Prerequisite: upper division standing; consent of instructor. Presentation and critical discussion of staff research activities; designed for advanced undergraduate students. May be repeated for a maximum of 3 units of credit when subject matter differs. (P/NP grading only.)

**192. Internship (1-12) I, II, III. The Staff (Chairperson in charge)**

Laboratory—3-36 hours. Technical and/or professional experience on or off campus. Supervised by a member of the Microbiology Department faculty. (P/NP grading only.)

**194H. Microbiology Honors Research (2) I, II, III. The Staff**

Independent study—6 hours. Prerequisite: senior standing; eligibility for college honors; completion of six units of 199 in microbiology; consent of department. Continuation of an individual microbiological research project culminating in writing of a senior thesis under a faculty director. (P/NP grading only.)

**197T. Tutoring in Bacteriology (1-5) I, II, III. The Staff (Chairperson in charge)**

Tutoring—1-5 hours. Prerequisite: course 3 and 18 upper division units in Microbiology; consent of chairperson. Assist in undergraduate laboratory courses supervised by teaching assistants or faculty; in discussion sections supervised by faculty; and staffing "drop-in" offices for individual help. (P/NP grading only.)

**198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

#### Graduate Courses

##### 200A-200B-200C. Microbiology for First-Year

**Graduate Students** (3-3) I-II-III. The Staff (Chairperson in charge)

Lecture—3 hours. Prerequisite: first-year graduate standing with interest in microbiology. A survey of general microbiology at the graduate level.

##### 210. Molecular Mechanisms in Microbial Pathogenesis

(3) II. Manning, Hirsh (Veterinary Microbiology and Immunology)  
Lecture—3 hours. Prerequisite: course 105 or Veterinary Microbiology 127 and course 162 or Veterinary Microbiology 128 or the equivalent. Study of the molecular mechanisms involved in cytopathogenesis of higher eukaryotic organisms. Emphasis on the alteration or inhibition of cellular metabolism and function by bacteria and animal viruses. Offered in odd-numbered years.

##### 215. Recombinant DNA

(2) I. Privalsky  
Lecture—2 hours. Prerequisite: courses 130A-130B or Biochemistry 101A-101B; Genetics 100. Application of the 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.

##### 215L. Recombinant DNA Laboratory

(4) I. Privalsky; II. The Staff  
Laboratory-discussion—10 hours. Prerequisite: course 130L or Biochemistry 101L; Genetics 100; consent of instructor. Application of the 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. (Submit application, available from Microbiology Department Office, two weeks prior to first day of class.)

##### \*240. Biology of Autotrophic Prokaryotes

(3) I. Meeks, Wheelis  
Lecture-discussion—3 hours. Prerequisite: Biochemistry 101B. Biochemistry and ecology of photo- and chemoautotrophic bacteria, and of methylotrophic bacteria, with special emphasis on the mechanisms of ATP and reductant generation. Offered in odd-numbered years.

##### \*250. Biology of Yeasts

(5) I. Bisson (Viticulture and Enology), C. Price (Food Science and Technology)

Lecture—3 hours; laboratory—6 hours. Prerequisite: consent of instructor. Survey of the genetics, physiology, regulatory mechanisms, structure, ecology and diversity of yeasts and related organisms. Offered in odd-numbered years.

**260. Bacterial Genetic Regulatory Mechanisms**

(3) II. Artz

Lecture-discussion—3 hours. Prerequisite: general knowledge of nucleic acid biochemistry and bacterial genetics. Analysis at the molecular level of genetic regulation in selected bacterial systems. Specific systems discussed will include the following types of regulation: control of transcription initiation and termination; translational controls; tRNA modification effects; autoregulation; control circuits in bacterial viruses; supercontrols. Offered in odd-numbered years.

##### 262. Advanced General and Molecular Virology

(3) III. Manning, Luciw (Medical Pathology), Bruening (Plant Pathology)

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.

##### \*270. Advanced Animal Virology

(3) III. Manning, Privalsky  
Lecture—3 hours. Prerequisite: consent of instructor. Selected advanced topics on biological and biochemical properties of animal viruses. May be repeated for credit. Offered in even-numbered years.

##### 290C. Advanced Research Conference

(1) I, II, III. The Staff (Chairperson in charge)  
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.)

##### 291. Selected Topics in Bacteriology

(1) I, II, III. The Staff (Chairperson in charge)  
Seminar—1 hour. Current progress in bacteriology and cellular and molecular biology. (S/U grading only.)

##### 292. Seminar in Bacterial Physiology, Genetics and Virology

(1) I, II, III. The Staff  
Seminar—1 hour. Prerequisite: consent of instructor. Review and discussion of current literature and developments in bacterial physiology, genetics, and virology with presentations by individual students. (S/U grading only.)

##### 296. Seminar in Animal Virology

(1) II. Manning  
Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current topics in animal virology. (S/U grading only.) (Same course as Veterinary Microbiology 292.)

##### 298. Group Study

(1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (S/U grading only.)

##### 299. Research

(1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

#### Faculty

Lieutenant Colonel Michael P. Tucker, Professor  
Major John F. Campbell, Assistant Professor  
Major John Cara, Assistant Professor  
Captain Robin B. Friedman, Assistant Professor

#### Program of Study

The Military Science Department extends the educational opportunities and provides extracurricular activities which qualify a student for a commission in the Army Reserve, National Guard, or Regular Army. The program assists qualified students in all academic fields to prepare for positions of leadership in military or civilian careers. A continuing effort is made to assign graduates to military career fields aligned with their major field of study, individual capabilities and preferences in one of seventeen career fields (i.e., Infantry, Engineer, Aviation, Medical Service Corps, Armor, Military Intelligence, etc.). Active duty obligation for ROTC graduates will not exceed four years for those who choose Active Duty or six months for those who choose Reserve Component Duty. The total combined service obligation is eight years.

#### Department Programs

Students are enrolled in military science under one of two programs.

##### Four-Year Program

Students are enrolled in the basic course (lower division) for the first two years on a voluntary basis. There is no military obligation associated with attendance in lower division courses. 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.

Upper division students receive \$100 subsistence per month after executing a contract agreeing to complete the course and accept a commission if offered. During the course all military science text books, uniforms and equipment are provided without cost. Students are given leadership development experience at summer camp (advanced camp) 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

This program is designed for students who have not attended lower division Military Science classes. In lieu of lower division courses an applicant attends a six-week summer camp (basic camp) which is voluntary and carries no military obligation. Applicants are paid for camp attendance and transportation costs. Applications are accepted during the winter and spring terms of the year preceding enrollment in the two-year program. 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 and Reserve Forces Duty scholarships to students planning to attend or attending UC Davis. The U.S. Army ROTC scholarship pays for your college tuition, laboratory fees, on-campus education fees, attendance at Advanced Camp, and a flat rate amount from which you may purchase textbooks, classroom supplies and equipment. Scholarship winners also receive a tax-free subsistence allowance of \$100 a month for 10 months for each year that the scholarship is in effect.

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. There are two cycles available for submission of the four-year scholarship application. High school juniors can compete for an Early Cycles

## Microbiology (A Graduate Group)

John C. Meeks, Ph.D., Chairperson of the Group  
Group Office, 156 Hutchison Hall (Microbiology  
Department), (916-752-0262)

**Graduate Study.** The Graduate Group in Microbiology offers study and research leading to the M.S. and Ph.D. degrees. For information on the graduate study and undergraduate preparation for the program contact a graduate adviser or the Chairperson of the group. See also the Graduate Division section in this catalog.

**Graduate Advisers.** B. L. Beaman (*Medical Microbiology*); R.B. LeFebvre (*Veterinary Microbiology and Immunology*); D.C. Nelson (*Microbiology*); D.M. Ogydziak (*Food Science and Technology*).

## Courses in Microbiology

#### Graduate Courses

##### 290C. Advanced Research Conference

(1) I, II, III. The Staff (Meeks in charge)  
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.)

##### 299. Research

(1-12) I, II, III. The Staff  
Research under the guidance of dissertation committee. (S/U grading only.)

## Military Science

(College of Letters and Science)

## Reserve Officers' Training Corps (ROTC), Army

Michael P. Tucker, Lt. Col., Chairperson of the  
Department  
Department Office, 125 Hickey Gymnasium  
(916-752-0541)

scholarship by submitting their application complete and postmarked by 15 July between their junior and senior years. Applicants will receive notification of their final status by 1 November. As high school seniors, students compete for the Regular Cycle scholarship by submitting their application complete and postmarked by 1 December. Those applicants not selected in the Early Cycle are considered in the Regular Cycle competition. Applicants will receive notification of their final status by 1 March of their senior year in high school. Interested applicants should see their high school counselor for an application or contact UC Davis, Department of Military Science.

The three-year Active Duty and two-year Active and Reserve Forces Duty scholarships are awarded to college students who are already attending UC Davis or transferring from a Junior College to UC Davis, and have three or two years remaining before graduating with a baccalaureate. Students interested in competing for these scholarships can submit their application beginning in November of each school year. The deadline for submission of an application is 15 January for the two-year scholarship and 15 February for the three-year scholarship. Additionally, students may win a two-year scholarship at the six-week summer camp (basic camp) in the Two-Year Program mentioned above. Students apply for these Army scholarships through the Military Science Department.

#### **DASE Cooperative Program**

The Department of the Army Scientific and Engineering (DASE) Cooperative Program is designed to support the U.S. Army's efforts to recruit, employ, and retain a science and engineer skilled work force as both military officers and civilian employees.

Qualified students may receive financial assistance of up to \$5,000 per year to pay for tuition, fees, books, lodging, and meals. Additionally, a \$1,000 per year stipend is paid to ROTC Advanced Course students during their last two years in school.

DASE Cooperative students must work in a Department of the Army (DA) Civilian position for a minimum of 26 weeks, typically divided into two thirteen week periods. At least one work period must be completed during the school year. While working, the DASE student will receive the regular pay and benefits for their grade.

Students must be enrolled full time in an undergraduate program leading to a degree in either science or engineering and enroll, or be enrolled, in the U.S. Army Senior ROTC Program. A first semester freshman applicant needs a high school minimum cumulative grade point average (GPA) of 2.75 on a 4.0 scale and a recommendation from the principal or guidance counselor. Other university applicants must have a 2.0 GPA and a minimum C average in all major fields of study. The DA civilian employers may set their standards above these averages.

Students choose to serve in either the Active Army or a Reserve Forces Component and apply for available DA Civilian positions for a specified period of employment.

For complete information you may contact the Military Science Department or the Planning and Placement Work Learning and Career Center, the Engineering and Physical Science Program Manager.

#### **Leadership Laboratory**

During the course of the school year, several weekends and two hours per week are spent in the conduct of 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 the Army ROTC Advance Camp.

#### **Military Qualifications Standards (MQS) System**

During the program of study, students will become

familiar with the MQS System. It is designed to articulate skills and knowledge that are required of ROTC commissioners to begin military service. The components of the MQS System include: military skills, professional knowledge, and a professional military education.

The military skills component consists of 67 military skills which are categorized into 12 subject areas. They are basic soldiering tasks fundamental to the military professional and serve as the basis for future branch-directed specialty training.

The 19 professional knowledge subjects familiarize cadets with the history, customs and traditions, leadership and ethics, administration, organization, and training of the U.S. Army.

The professional military education component consists of two essential parts—a baccalaureate degree and at least one undergraduate course from each of five designated fields of study. Cadets must take a course in written communication, military history, human behavior, math reasoning, and computer literacy.

#### **Academic Credit**

**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.

**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 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.

**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.

#### **Courses in Military Science**

##### **Lower Division Courses**

###### **11. Roles and Organization of the U.S. Army (1) I.**

Lecture—1 hour. Prerequisite: lower division status. Constitutional and legal basis of the Army, organization and strategic roles in times of war and peace, and "total Army" concept. Impact of civil-military relations and Soviet military power on role of Army studied in context of current problems.

###### **12. Introduction to Military Leadership and Map Reading (1) I.**

Lecture—1 hour. Prerequisite: lower division status. Introduction to leadership theories used in military organizations. Course surveys the duties and responsibilities of junior Army officers, the general environment that officers lead, and the leadership roles performed. Introduces military map reading.

###### **13. Introduction to Basic Military Operations (1) III.**

Lecture—1 hour. Prerequisite: lower division status. Basic military tactical theories and their application at the individual and squad level. Course introduces military tactical operations, and covers military first aid. Principles of war as introduced in course 11 are applied to offensive and defensive tactics.

###### **14A. Introduction to Military Leadership Skills (1/2) I.**

Laboratory—2 hours. Prerequisite: lower division status and consent of instructor; completion of all previous laboratories. 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 are also covered. (P/NP grading only.)

###### **14B. Introduction to Military Leadership Skills (1/2) II.**

Laboratory—2 hours. Prerequisite: lower division status and consent of instructor; completion of all previous laboratories. Development of leadership and military skills introduced in course 14A is continued with emphasis on the individual's role in the squad, the basic organizational element of the Army. As students gain capabilities, supervisory controls are reduced. (P/NP grading only.)

###### **14C. Introduction to Military Leadership Skills (1/2) III.**

Laboratory—2 hours. Prerequisite: lower division standing and consent of instructor; completion of all previous laboratories. Students demonstrate skill levels required for promotion to non-commissioned officer level. Use of chain of command from company through individual levels emphasized. Interrelationship of squad and platoon organizations is explored. (P/NP grading only.)

###### **21. Military History (2) III.**

Lecture—2 hours. Prerequisite: lower division status; course 11 or consent of instructor. Survey of military history from 1900 to present, focusing on World War I, World War II, the Korean War, and the Vietnam War.

###### **22A. Intermediate Military Leadership and Operations: I (2) II.**

Lecture—2 hours. Prerequisite: lower division status; course 12 or consent of instructor. Develops and exercises personal military leadership skills in extensive supervised leadership laboratories. Intermediate level military skills necessary for leadership roles as junior non-commissioned officers are developed. Students perform in role of junior non-commissioned officers.

###### **22B. Intermediate Military Leadership and Operations: II (2) I.**

Lecture—2 hours. Prerequisite: lower division status; course 22A or consent of instructor. Continuation of course 22A. Individual leadership traits identified in course 22 are studied in more depth enabling each student to improve on targeted weaknesses. Instruction is presented in intermediate defensive tactics at the squad level.

###### **24A. Individual Military Leadership Skills (1/2) I.**

Laboratory—2 hours. Prerequisite: lower division status; courses 14A, 14B, 14C and 21, or consent of instructor. Develops and exercises personal military leadership skills in extensive supervised leadership laboratories. Intermediate level military skills necessary for leadership roles as junior non-commissioned officers are developed. Students perform in role of junior non-commissioned officers. (P/NP grading only.)

###### **24B. Individual Military Leadership Skills (1/2) II.**

Laboratory—2 hours. Prerequisite: lower division status; courses 14A, 14B, 14C and 21, or consent of instructor. Personal supervisory and leadership styles are developed in a supervised laboratory environment. Students are rotated through squad and team-level supervisory positions, given responsibility concomitant with positions. (P/NP grading only.)

###### **24C. Individual Military Leadership Skills (1/2) III.**

Laboratory—2 hours. Prerequisite: lower division status; courses 14A, 14B, 14C and 21, or consent of instructor. Students are prepared for transition from junior leader to senior non-commissioned officer. Chain of command and hierarchical responsibilities and reporting requirements are demonstrated in a laboratory setting. (P/NP grading only.)

##### **Upper Division Courses**

###### **131. Advanced Military Leadership and Management (2) III.**

Lecture—2 hours. Prerequisite: upper division status; course 22A or consent of instructor. Course addresses different types of power and influence a military leader may use, reviews counseling techniques, and introduces basic management skills. Instruction provided on the various branches in which a commissioned officer could serve.

###### **132A. Advanced Military Operations (2) I.**

Lecture—2 hours. Prerequisite: upper division status; course 22B or consent of instructor. First phase of

advanced military tactical operations. Advanced work on topographical maps, navigation, and orienteering techniques. Instruction is also provided on resource planning techniques and military intelligence.

#### 132B. Advanced Military Operations (2) II.

Lecture—2 hours. Prerequisite: upper division status; course 132A or consent of instructor. Continuation of course 132A. Military tactical theories and their application in offense and defense are presented at the platoon and company level. Course covers in-depth analysis of the principles of war related to offensive and defensive operations.

#### 134A. Military Organizational Leadership Skills (1/2) I.

Laboratory—2 hours. Prerequisite: upper division status; courses 24A-24B-24C or consent of instructor. Students develop interpersonal and management skills by practical application of leadership of military organizations in a supervised leadership laboratory. Advanced-level military skills presented. Students fulfill the roles of senior non-commissioned officers. (P/NP grading only.)

#### 134B. Military Organizational Leadership Skills (1/2) II.

Laboratory—2 hours. Prerequisite: upper division status; courses 24A-24B-24C or consent of instructor. As more complex material is presented in classroom, the laboratory environment becomes more challenging. Students serve as senior non-commissioned officers in squad, platoon and company levels, given appropriate authority and responsibility. (P/NP grading only.)

#### 134C. Military Organizational Leadership Skills (1/2) III.

Laboratory—2 hours. Prerequisite: upper division status; courses 24A-24B-24C or consent of instructor. Students prepared for advanced summer training experience by extensive requirements to plan, organize and conduct military operations in field environments; individual leadership potential is closely assessed in the laboratory environment. (P/NP grading only.)

#### 141. U.S. Army Management Systems (2) III.

Lecture—2 hours. Prerequisite: upper division status and course 131. Army decision making, personnel and equipment management. Includes command and staff functions, training, intelligence gathering, techniques for the conduct of meetings, and logistics management procedures at unit level.

#### 142. Military Law (2) II.

Lecture—2 hours. Prerequisite: upper division status and course 141. Analysis of the American Military Justice System, the Uniform Code of Military Justice, the Hague and Geneva Conventions, and customary law of war. Includes detailed study of selected procedures of military justice system.

#### 143. Military Ethics and Professionalism (2) I.

Lecture—2 hours. Prerequisite: upper division status and course 142. Profession of arms, its characteristics, uniqueness, roles, and responsibilities. Discussion topics include the professional soldier's responsibilities to the Army and the Nation, and the need for ethical conduct. Case studies are used to develop ethical decision making skills.

#### 144A. Military Training Leadership Skills (1/2) I.

Laboratory—2 hours. Prerequisite: upper division status; courses 134A, 134B, 134C, and 141. Develops and exercises the leadership skills necessary to plan, coordinate and conduct a training program through practical application under supervision. Emphasis on analysis of objectives, instructor planning, media utilization and evaluation of learning. Students perform as cadet officers. (P/NP grading only.)

#### 144B. Military Training Leadership Skills (1/2) II.

Laboratory—2 hours. Prerequisite: upper division status; courses 134A, 134B, 134C, and 141. Requirements for training of all other levels of the cadet corps are given to students for conduct in laboratory environment (under supervision). Students placed in realistic role of junior officer with appropriate level of responsibility. Students perform as cadet staff officers. (P/NP grading only.)

#### 144C. Military Training Leadership Skills (1/2) III.

Laboratory—2 hours. Prerequisite: upper division status; courses 134A, 134B, and 134C. Final laboratory in military science sequence; students are prepared for final testing and certification prior to commissioning as officers. Students will demonstrate all leadership skills necessary to commissioned officers. Students perform leadership tasks at platoon, company, and battalion levels. (P/NP grading only.)

### Aerospace Studies (Air Force)

Air Force ROTC is available to UC Davis students through a program offered at California State University, Sacramento (CSUS). UC Davis' participation is large, with about 30 percent of the corps commuting from that campus. The CSUS Department of Aerospace Studies (AFROTC) offers a two or four-year program leading to a commission in the United States Air Force. All course work (12 or 16 semester units) is completed on the CSUS campus with the exception of Field Training conducted during part of the summer at an active Air Force base between the student's sophomore and junior years. Upon completion of the program (integrated with UCD's quarter system) and all requirements for the Bachelor's degree, cadets are commissioned second lieutenants in the Air Force and serve a minimum of four years on active duty. Graduates who are qualified and selected may enter pilot or navigator training after graduation, or serve in a specialty consistent with their academic major, individual goals, and existing Air Force needs. Graduates may request a delay of entry on active duty to continue their education or may apply for Air Force sponsored graduate study to begin immediately upon entry on active duty. Due to firm scheduling requirements for the AFROTC program, students are encouraged to work closely with their academic advisers in planning this academic program.

Application to the AFROTC Program should be no later than the middle of a student's sophomore year. Contact representatives in the Aerospace Studies Department at CSUS, telephone (916) 278-7315, for information on the program or processing of entry. (An AFROTC Program is also available within the UC system at Berkeley campus, Department of Aerospace Studies, (415) 642-3572.)

AFROTC offers 3 1/2-, 3-, 2 1/2-, and 2-year scholarships to qualified students. Applications are accepted in a variety of academic disciplines; however, particular emphasis will be given to applicants in the fields of engineering, navigation, and meteorology.

### Navy ROTC

Navy ROTC is available to UC Davis students through a cross-enrollment program with the University of California at Berkeley (UCB). Full credit for UCB courses will be given by UC Davis and grades for these courses will appear on University transcripts. Students who successfully complete the NROTC program receive commissions as Ensigns in the United States Navy or Second Lieutenants in the United States Marine Corps. Specific questions concerning this program should be directed to the Professor of Naval Science, 25 Callaghan Hall, UCB, Berkeley, CA 94720 (415-642-3551).

NROTC offers 2-, 3-, and 4-year scholarships to qualified applicants on a nationally competitive basis. Scholarships provide uniforms, tuition, book costs, and \$100 per month subsistence.

Students are required to attend weekly professional laboratories (drill) at UCB and complete required Naval Science courses. Drills and courses are normally offered on Wednesdays in the late afternoon and evening. These drill sessions offer the midshipmen an active role in the management and direction of the student battalion and provide a time period for midshipmen to explore professional topics. Scholarship and senior college program students participate in four- to six-week summer training cruises aboard navy ships throughout the world.

## Music

(College of Letters and Science)

David A. Nutter, Ph.D., Chairperson of the Department  
Department Office, 112 Music Building  
(916-752-0666)

### Faculty

Lawrence E. Anderson, Ph.D., Lecturer  
Ross Bauer, Ph.D., Assistant Professor  
Robert S. Bloch, M.A., Professor  
Anna Maria Busse Berger, Ph.D., Assistant Professor  
Sydney R. Charles, Ph.D., Professor Emeritus  
Andrew D. Frank, M.A., Professor  
D. Kern Holoman, Ph.D., Professor  
Mary E. Lust, B.A., Lecturer  
Albert J. McNeil, M.S., Professor Emeritus  
Maria A. Niederberger, Ph.D. candidate, Lecturer  
David A. Nutter, Ph.D., Associate Professor  
Christopher A. Reynolds, Ph.D., Associate Professor  
Jerome W. Rosen, M.A., Professor Emeritus  
Wayne Slawson, Ph.D., Professor  
Richard G. Swift, M.A., Professor  
William E. Valente, M.A., Professor

### Faculty Affiliates in Applied Music

Elizabeth Blumenstock, Lecturer (*violin, viola*)  
Dona Lee Brandon, M.S.M., Lecturer (*organ*)  
Lois Brandwynne, M.A., Lecturer (*piano*)  
Diana Dallman, M.M., Lecturer (*viola da gamba*)  
Thomas Derthick, B.M., Lecturer (*string bass*)  
Joel Elias, M.M., Lecturer (*trombone*)  
Emily Ferguson, M.M., Lecturer (*oboe*)  
Sarah Freiberg, D.M.A., Lecturer (*cello*)  
Stephanie Friedman, M.A., Lecturer (*voice*)  
David Granger, M.M., Lecturer (*bassoon*)  
Edward Higgins, M.M., Lecturer (*trumpet*)  
Stanley Lunetta, M.A., Lecturer (*percussion*)  
Peter Nowlen, B.M., Lecturer (*French horn*)  
Deborah Pittman, M.A., Lecturer (*clarinet*)  
Robin Richman, B.M., Lecturer (*flute*)  
Stephen Schultz, M.M., Lecturer (*Baroque flute*)  
Marilyn Swan, B.M., Lecturer (*piano*)

### The UC Davis Contemporary Music Players

Ross Bauer, Director  
Robert Samson Bloch, violin and viola  
Thomas Derthick, bass  
Sarah Freiberg, cello  
Peter Nowlen, French horn  
Sarn Oliver, violin  
Deborah Pittman, clarinet  
Karen Rosenak, piano  
Laurel Zucker, flute  
and guest artists

### The UCD Faculty Woodwind Quintet

Emily Ferguson, oboe  
David Granger, bassoon  
Deborah Pittman, clarinet  
Robin Richman, flute  
Peter Nowlen, French horn

### The Major Program

The Department of Music offers a unique program of study for a career in music as part of a broadly-based liberal arts education leading to the Bachelor of Arts degree.

The student engages in the study and performance of music of all styles and periods. Options are provided for those students with special interests in composition, history, teaching and performance, and for those who plan to continue in graduate work in music.

### A.B. Major Requirements:

	UNITS
Preparatory Subject Matter .....	54
Music 4A, 4B, 4C, 5A, 5B, 5C, 24A, 24B, 24C, 25A, 25B, 25C .....	51

Music 30, 31 (or the equivalent as determined in consultation with major adviser), one year	3
Piano skills, Music P (required of all majors)	0
<b>Depth Subject Matter</b> .....38	
Music 104A, 104B, 104C	12
At least 12 units selected from Music 121, 122, 190	12
At least 6 units selected from Music 107A, 107B, 107C, 108A, 108B, 111, 112, 113A, 113B, 198, 199	6
At least 8 units in performance courses	8
Select from Music 130 or 131, 141, 142, 143, 144, 145, 146.	
<b>Total Units for the Major</b> .....92	

**Beginning and transfer students** must take an examination in piano playing. Sufficient pianistic ability to perform four-part chorales and compositions comparable in difficulty with *The Little Preludes* of Bach is prerequisite to upper division courses in the major. Students with deficiencies will be required to pass Music P. All majors in music will be expected to perform the compositions cited above before a jury of faculty members prior to advancement into the upper division. Students transferring from other colleges should take the Placement Examination and consult with departmental major advisers before enrolling in any music course.

**Foreign Language Requirement.** Attention is called to the requirements in foreign languages for higher degrees in music.

**Major Advisers.** C.A. Reynolds, W.E. Valente.

## Minor Program Requirements:

	UNITS
<b>Music</b> .....18	
A minimum of eighteen units of upper division Music courses	18
Courses chosen with adviser's consent from: Music 107A, 110 (maximum of two courses), 111, 112, 121 (minimum of two courses)	
A maximum of two units in performance courses (Music 130, 141, 142, 143, 144, 145, 146) may count toward the minor.	
Lower-division preparatory work to be determined in consultation with minor advisers.	

**Teaching Credential Subject Representative.** L. E. Anderson. See also the section on the Teacher Education Program.

**Graduate Study.** The Department of Music offers programs of study and research leading to the M.A., M.A.T., and Ph.D. degrees. Detailed information regarding graduate study may be obtained from the Graduate Adviser.

**Graduate Adviser.** D. K. Holoman.

## Courses in Music

### Lower Division Courses

#### P. Rudimentary Piano (0) I, II, III. The Staff

Laboratory—1 hour. Prerequisite: Music majors and minors enrolled in course 4 (concurrently). Designed to train students to meet the minimal piano requirements for the major or minor in music. (P/NP grading upon completion of term.)

#### 1. Basic Musicianship (3) II, III. Anderson

Lecture—3 hours. Fundamentals of music, singing, ear-training and conducting for beginners in music. Designed for students with career plans where musical literacy is important, for example, primary level classroom teachers, actors, theatre directors, designers, and stage managers. Not open to students who have successfully completed 3A, 4A, or the equivalent.

#### 3A. Introduction to Music Theory (4) I. Bloch; II. Lust; III. The Staff

Lecture—3 hours; laboratory—1 hour. Fundamentals

of music theory, ear-training, harmony, counterpoint, and analysis directed toward the development of listening and writing techniques. Intended for the general student. General Education credit for two-course sequence of non-GE courses (3A-3B) which will satisfy requirement for one course: Civilization and Culture/Introductory.

#### 3B. Introduction to Music Theory (4) I. Niederberger; II. Bloch; III. Lust

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 3A. Continuation of course 3A. Intended for the general student. General Education credit for two-course sequence of non-GE courses (3A-3B) which will satisfy requirement for one course: Civilization and Culture/Introductory.

#### 4A-4B-4C. Elementary Theory (5-5-5) I, II. Frank, Niederberger; III. Bauer, Niederberger

Lecture-discussion—4 hours; practicum—2 hours. Development of music writing and listening skills through the study of music fundamentals, tonal species counterpoint, harmony, score reading, analysis of repertoire. Intended primarily for music majors and minors.

#### 5A-5B-5C. Intermediate Theory (4-4-4) I, II, III. Valente

Lecture-discussion—3 hours; practicum—2 hours. Prerequisite: course 4C. Study of imitative tonal counterpoint and of harmony; keyboard harmony; analysis of repertoire.

#### 10. Introduction to Musical Literature (4) I. Wilson, Pittman, Schultz; II. Bloch, Wilson, Pittman; III. Wilson, Pittman, and staff

Lecture—3 hours; listening section—1 hour. An introduction to composers and major styles of Western music. Lectures, listening sections, and selected readings. For non-majors. General Education credit: Civilization and Culture/Introductory.

#### 24A. Introduction to the History of Music, I (4) I. Reynolds

Lecture—3 hours; listening section—1 hour. Prerequisite: course 4A or 3A (concurrently). Intended primarily for majors and minors in music. History of music from the late Baroque to the Classical Period.

#### 24B. Introduction to the History of Music, II (4) II. Reynolds

Lecture—3 hours; listening section—1 hour. Prerequisite: course 24A; course 4B or 3B (concurrently). Intended primarily for majors and minors in music. History of music from the Classical Period to the nineteenth century.

#### 24C. Introduction to the History of Music, III (4) III. Reynolds

Lecture—3 hours; listening section—1 hour. Prerequisite: course 4B or 3B; course 4C (concurrently). Intended primarily for majors and minors in music. History of music from the nineteenth century to the present.

#### 25A. Introduction to the History of Music, IV (4) I. Busse Berger

Lecture—3 hours; listening section—1 hour. Prerequisite: courses 4C and 24C; course 5A (concurrently). Intended primarily for majors and minors in music. Historical survey of composers and musical styles from antiquity to around 1400.

#### 25B. Introduction to the History of Music, V (4) II. Busse Berger

Lecture—3 hours; listening section—1 hour. Prerequisite: courses 5A and 25A; course 5B (concurrently). Intended primarily for majors and minors in music. Historical survey of composers and musical styles from around 1400 to around 1600.

#### 25C. Introduction to the History of Music, VI (4) III. Busse Berger

Lecture—3 hours; listening section—1 hour. Prerequisite: courses 5B and 25B; course 5C (concurrently). Intended primarily for majors and minors in music. Historical survey of composers and musical styles from around 1590 to around 1680.

#### 28. Introduction to Afro-American Music (4) II. Pittman

Lecture—3 hours; listening and discussion—1 hour. A study of the Afro-American rhythm, field hollers,

work songs, spirituals, blues, gospel, and jazz; the contrast between West African, Afro-Caribbean, and Afro-Cuban musical traditions.

#### 30A-U. Applied Study of Music: Intermediate (1) I, II, III. The Staff

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: (A) Voice (prerequisite of course 1 or the equivalent); (B) Piano; (C) Harpsichord; (D) Organ; (E) Violin; (F) Viola; (G) Cello; (H) Double Bass; (I) Flute; (J) Oboe; (K) Clarinet; (L) Bassoon; (M) French Horn; (N) Trumpet; (O) Trombone; (P) Tuba; (Q) Percussion; (R) Classical Guitar; (S) Lute; (T) Viola da gamba; (U) Recorder. May be repeated for credit. Offered as demand indicates.

#### 31A-U. Applied Study of Music: Intermediate (Individual) Performance Instruction (2) I, II, III. The Staff

Performance instruction—1/2 hour; practice—5 hours. Prerequisite: open to Music majors only; admission by audition and consent of instructor. Individual instruction in (A) Voice (prerequisite of course 1 or the equivalent); (B) Piano; (C) Harpsichord; (D) Organ; (E) Violin; (F) Viola; (G) Cello; (H) Double Bass; (I) Flute; (J) Oboe; (K) Clarinet; (L) Bassoon; (M) French Horn; (N) Trumpet; (O) Trombone; (P) Tuba; (Q) Percussion; (R) Classical Guitar; (S) Lute; (T) Viola da gamba; (U) Recorder. May be repeated for credit.

#### 41. University Symphony (2) I, II, III. Holoman

Rehearsal—4 hours. Prerequisite: admission subject to audition before the 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.)

#### 42. University Chamber Singers (2) I, II, III. The Staff

Rehearsal—3 hours, plus sectionals—at least 1 hour. 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.)

#### 43. University Concert Band (2) I, II. Valente; III. The Staff

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.)

#### 44. University Chorus (2) I, II, III. The Staff

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.)

#### 45. Early Music Ensemble (2) I, II, III. Nutter

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of Medieval, Renaissance and Baroque music for vocal ensemble and historical instruments. May be repeated for credit. (P/NP grading only.)

#### 46. Chamber Music Ensemble (1) I, II, III. The Staff (Chairperson in charge)

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.)

#### 99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Upper Division Courses****104A-104B-104C. Advanced Theory (4-4-4) I-II-III.**

Bauer

Lecture—4 hours. Prerequisite: course 5C. Twentieth-century compositional procedures: analyses and projects in composition.

**107A. Computer and Electronic Music (3) I.**

Slawson

Lecture—3 hours; laboratory—1 hour. Prerequisite: consent of instructor. Studies in electronic and computer music composition. The principles and procedures of composition in various electronic media are explored through compositional exercises. (Limited enrollment.)

**107B. Computer and Electronic Music (3) II.**

Slawson

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 107A and consent of instructor. Continuation of course 107A. (Limited enrollment.)

**107C. Computer and Electronic Music (3) III.**

Slawson

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 107B and consent of instructor. Continuation of course 107B. (Limited enrollment.)

**\*108A-108B. Orchestration (2-2) II, III.**

The Staff  
Lecture—2 hours. Prerequisite: course 5C. Techniques of orchestration from study of basic instrumental techniques to analysis of orchestral scores and scoring for various instrumental combinations.

**\*109. Masterworks in Performance (2) I.**

Holoman  
Lecture—2 hours. Prerequisite: course 10 recommended. Thorough score study of a single masterwork to be performed on campus during the quarter. Guided listening, selected readings, analysis and study of composer's milieu. Recommended especially for members of the performing ensembles scheduled to present the work.

**110A. The Music of a Major Composer: Beethoven (4) II.**

Frank, Slawson

Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. 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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Music 3A-3B or 10.

**\*110B. The Music of a Major Composer: Stravinsky (4) II.**

Frank, Reynolds

Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. 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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Music 3A-3B or 10.

**110C. The Music of a Major Composer: Bach (4) I.**

Bloch, Nutter

Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. 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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Music 3A-3B or 10.

**110D. The Music of a Major Composer: Mozart (4) III.**

Swift, Valente

Lecture—3 hours; discussion—1 hour. Prerequisite: course 10 or 3A-3B. 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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Music 3A-3B or 10.

**111. Choral Conducting (2) II.**

The Staff  
Lecture—2 hours. Prerequisite: courses 4A-4B-4C and consent of instructor. Principles and techniques of conducting choral ensembles.

**\*112. Instrumental Conducting (2) I.**

Holoman  
Lecture—2 hours. Prerequisite: courses 4A-4B-4C and consent of instructor. Principles and techniques

of conducting instrumental ensembles.

**\*113A. Music of Non-Western Civilizations (2) I.**

Lecture—2 hours; listening section—1 hour. Prerequisite: course 25A. Study of the native music of Asia. Offered in even-numbered years.

**\*113B. Music of Non-Western Civilizations (2) III.**

Lecture—2 hours; listening—1 hour. Prerequisite: course 25A. Study of the native music of Africa and the Western Hemisphere. Course 113A is not prerequisite to 113B. Offered in even-numbered years.

**121. Topics in Music History and Criticism (4) III.**

Bloch

Seminar—4 hours (includes selected listening). Prerequisite: courses 4A-4B-4C, 24A-24B-24C, and 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.

**122. Topics in Analysis and Theory (4) I.**

Frank

Bauer  
Seminar—4 hours (includes selected listening). Prerequisite: courses 5C and 25C. 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.

**\*129. World Music (4) I.**

The Staff

Lecture—3 hours; listening—1 hour; selected readings. Prerequisite: course 3A-3B or 10 recommended. Intended for non-majors. Studies in selected areas of non-western music, including appropriate instrumental and performing techniques, analysis of tonal systems, melody, rhythm and musical structures. Emphasis placed on cultural context of the music. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Music 3A-3B or 10.

**130A-U. Applied Study of Music: Advanced (1) I, II, III.**

The Staff

Performance—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: (A) Voice (prerequisite of course 1 or the equivalent); (B) Piano; (C) Harpsichord; (D) Organ; (E) Violin; (F) Viola; (G) Cello; (H) Double Bass; (I) Flute; (J) Oboe; (K) Clarinet; (L) Bassoon; (M) French Horn; (N) Trumpet; (O) Trombone; (P) Tuba; (Q) Percussion; (R) Classical Guitar; (S) Lute; (T) Viola da gamba; (U) Recorder. May be repeated for credit. Offered as demand indicates.

**131A-U. Applied Study of Music: Advanced (Individual) (2) I, II, III.**

The Staff

Performance—1/2 hour; practice—5 hours. Prerequisite: open to Music majors only; admission by audition and consent of instructor. Individual instruction in (A) Voice (prerequisite of course 1 or the equivalent); (B) Piano; (C) Harpsichord; (D) Organ; (E) Violin; (F) Viola; (G) Cello; (H) Double Bass; (I) Flute; (J) Oboe; (K) Clarinet; (L) Bassoon; (M) French Horn; (N) Trumpet; (O) Trombone; (P) Tuba; (Q) Percussion; (R) Classical Guitar; (S) Lute; (T) Viola da gamba; (U) Recorder. May be repeated for credit.

**141. University Symphony (2) I, II, III.**

Holoman

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.)

**142. University Chamber Singers (2) I, II, III.**

The Staff

Rehearsal—3 hours, plus sectionals—at least 1 hour. 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.)

**143. University Concert Band (2) I, II.**

Valente; III.

The Staff  
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.)

**144. University Chorus (2) I, II, III.**

The Staff  
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.)

**145. Early Music Ensemble (2) I, II, III.**

Nutter  
Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Rehearsal and performance of Medieval, Renaissance, and Baroque music for vocal ensemble and historical instruments. May be repeated for credit. (P/NP grading only.)

**146. Chamber Music Ensemble (1) I, II, III.**

The Staff (Chairperson in charge)

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.)

**\*190. Senior Seminar in Music (4) I.**

The Staff (Nutter in charge)  
Lecture—4 hours. Prerequisite: courses 5C and 25C, and consent of instructor; course 104C recommended. Intended primarily for majors in music intending to apply for graduate programs in music history, composition, or theory. Review of musical skills, issues in theory and analysis, and the history and literature of music.

**198. Directed Group Study (1-5) I, II, III.**

The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.**

The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses****200. Music Research (4) I.**

Reynolds

Seminar—3 hours; term paper. Introduction to problems and techniques of research; practical application of music bibliography to questions about significant issues in musicology, music theory, and performance practice.

**201. Advanced Music Research and Criticism (4) II.**

Swift

Seminar—3 hours; term paper. Study and practice of expository writing about music. Application of advanced research techniques in writing for different purposes, ranging from essays for the general public to thesis proposals and articles for scholarly journals.

**202. Notation (4) III.**

Busse Berger

Seminar—3 hours; term paper. Study of musical notation; investigation of techniques for editing Medieval and Renaissance music.

**203A-203B-203C. Composition (4-4-4) I.**

Frank; II. Bauer; III. Swift

Seminar—3 hours. Technical projects and free composition.

**204. Advanced Conducting (3) I, II, III.**

The Staff (Holoman in charge)

Tutorial—2 hours; practicum—2 hours. Prerequisite: courses 111, 112, or the equivalent; keyboard skills appropriate to graduate standing. Technical aspects of conducting and the broader issues in music history and analysis that conductors must face before leading a rehearsal or performance.

**\*207. Advanced Electronic and Computer Music (4) II.**

Slawson

Seminar—2 hours; plus individual student/instructor meeting—2 hours. Prerequisite: courses 107A-107B-107C. Advanced composition of computer and electronic music with the Sun 3-based computer-music system and associated facilities.

**210A. Proseminar in Music (Theory and Analysis) (4) I.**

Slawson

Seminar—3 hours; term paper. Voice-leading analy-

sis of tonal music derived from Schenker and pitch-class set theory. Recent work on compositional design, generalizations of the concept of interval, psychologically-oriented music theory, and theories of durational structure and timbre.

**210B. Proseminar in Music (Musicology and Criticism) (4) II.** Reynolds and staff

Seminar—3 hours; term paper. 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.

**210C. Proseminar in Music (Ethnomusicology) (4)**

III. The Staff

Seminar—3 hours; term paper. Intensive examination of major trends in ethnomusicology as exemplified by scholars working in several non-Western cultures. Ethnomusicological theory, ranging from ethnographic description to metamusicological study (Seeger) to analysis of individual genres to sociological study.

**221. Topics in Music History (4) I.** Busse Berger;

III. Nutter

Seminar—3 hours. Studies in selected areas of music history and theory. May be repeated for credit.

**222. Techniques of Analysis (4) II.** Swift

Seminar—3 hours. Analysis and analytical techniques as applied to music of all historical style periods. May be repeated for credit.

**\*223. Ethnomusicology (Pacific Cultures) (4) I, II,**

III. The Staff

Seminar—3 hours; term paper. Court music, religious music, and popular forms of China, Japan, Korea, Melanesia, and Indochina. Issues concerning history, theoretical constructs, performance practice, and cultural settings of the music will be stressed. May be repeated for credit.

**299. Individual Study (1-12) I, II, III.** The Staff (Holoman in charge)

(S/U grading only.)

**Teaching Methods Courses**

**\*300. The Teaching of Music (3) II.** Anderson

Lecture—3 hours. Prerequisite: course 1 or the equivalent. Methods of teaching music in grades K-6.

**301. The Teaching of Music (3) II.** Anderson

Lecture—3 hours. Prerequisite: course 5C (or the equivalent). Methods of teaching music in grades 7-12.

**Instrumental Methods.** The courses in this series consider methods of teaching orchestra and band instruments, and include repertory and program planning for secondary schools.

**321A-321B. Stringed Instruments (1-1) I-II.** The Staff

Discussion—2 hours. Prerequisite: course 4C.

**322. Brass Instruments (1) III.** Anderson

Laboratory—2 hours. Prerequisite: course 4C. Offered in odd-numbered years.

**\*323A-323B. Woodwind Instruments (1-1) II-III.**

Anderson

Discussion—2 hours. Prerequisite: course 4C.

**324. Percussion Instruments (1) II.** Lunetta

Laboratory—2 hours. Prerequisite: course 4C. Considers teaching of percussion instruments. Survey course. Offered in odd-numbered years.

## Native American Studies

(College of Letters and Science)

Jack D. Forbes, Ph.D., Program Director  
Program Office, TB 113 (916-752-3237)

**Committee in Charge**

Jack D. Forbes, Ph.D. (*Anthropology, Native American Studies*)  
George C. Longfish, M.F.A. (*Native American Studies*)

David Risling, M.A. (*Native American Studies*)  
David A. Robertson, Ph.D. (*English*)  
Lenora A. Timm, Ph.D. (*Linguistics*)  
Delbert L. True, Ph.D. (*Anthropology*)

**Faculty**

Jack D. Forbes, Ph.D., Professor  
Carl N. Gorman, M.F.A., Lecturer Emeritus  
Inés Hernandez, Ph.D., Assistant Professor  
Sara Hutchison, M.A., Lecturer Emeritus  
George C. Longfish, M.F.A., Professor  
David Risling, M.A., Senior Lecturer

### The Major Program

Native American Studies focuses upon the indigenous peoples of the Americas, that is, upon the peoples, nations, and tribes whose ancestors have lived in both North and South America for thousands of years. Native American Studies is interdisciplinary in its approach to the world of American Indian peoples, offering a comprehensive and comparative perspective.

The major in Native American Studies is designed to fulfill several purposes. First, it is intended as a broadly interdisciplinary undergraduate major bridging the humanities and social sciences through the medium of studying the philosophy and values, society, politics, way of life, and development through time of the indigenous peoples of the Americas. Second, it is designed to provide students with concrete insight into the civilizational unity of Native American peoples as well as the specific diversity in which this fundamental unity is expressed throughout the hemisphere. Third, the major is intended to develop research capabilities, critical intelligence, and to foster an understanding of the broad human experience, both in the past and present, by means of course work in which Native American life and thought serves as the vehicle for analysis, comparison, and synthesis. Fourth, the major is intended to foster the student's creative development and to illustrate how, in traditional Native American life, the aesthetic and artistic aspects are an integral part of the cultural whole.

Native American Studies is also a practical major if one is considering a professional career such as teaching, law, human services, health, tribal administration, and inter-ethnic relations, among other fields. Graduate schools and agencies in these and related areas are often looking for students who are broadly prepared in an interdisciplinary way and who possess knowledge and sensitivity relating to ethnic issues and cultural diversity. Specifically, schools and agencies are increasingly looking for personnel with expertise in relation to Native American peoples since they comprise a rapidly growing population throughout the hemisphere.

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). The purpose of Plan II is to encourage interested students to focus upon Meso-America with, however, some course work integrating Meso-America with North America and South America. Plan III is intended to encourage students to focus upon South America with, however, course work integrating that region with areas to the north. Advisers will be encouraging students in developing their topics for

research papers and projects, to concentrate upon one of these three regions in accord with the plan they have selected.

### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b>	
<b>(Plans I, II, and III) .....</b>	<b>20</b>
Native American Studies 1 .....	4
Native American Studies 32, 33, 55, 70, or three of the above courses and one course from History 17A, History 22, Anthropology 2 or 3 .....	16
<b>Depth Subject Matter</b>	
<b>(Plans I, II, and III) .....</b>	<b>16</b>
Native American Studies 130A .....	4
Native American Studies 130B or 130C .....	4
Native American Studies 157 .....	4
Native American Studies 180 .....	4
<b>Plan I (North American Emphasis)</b>	
Preparatory Subject Matter (see above) .....	20
Depth Subject Matter (see above) .....	16
Two courses from Native American Studies 116, 117, 118, 124 .....	8
Two courses from Native American Studies 101, 181A, 181B, 181C .....	8
Two courses from Anthropology 113, 134, 141A, 141B, 141C, 172, 173, 174, 175, 176, Geography 120, History 173A .....	8
One other upper division Native American Studies course, selected in consultation with your major adviser .....	4
<b>Total Units for the Major, Plan I .....</b>	<b>64</b>
<b>Plan II (Mexico-Central America Emphasis)</b>	
Preparatory Subject Matter (see above) .....	20
Depth Subject Matter (see above) .....	16
Three courses from History 161A, 166A, 166B, Geography 122A .....	12
Two courses from Anthropology 134, 141B, 174, 175, Native American Studies 161 .....	8
One course from Spanish 129, 135, Art 151 .....	4
One course from Native American Studies 101, 181A, 181B, 181C, or from 107, 188, 191 if specifically focused upon a Meso-American language or topic .....	4
<b>Total Units for the Major, Plan II .....</b>	<b>64</b>
<b>Plan III (South American Emphasis)</b>	
Preparatory Subject Matter (see above) .....	20
Depth Subject Matter (see above) .....	16
Three courses from History 161A, 161B, 162, 163A, 163B, 165, Geography 122B .....	12
Two courses from Anthropology 134, 141B, 144, 174, 175, Native American Studies 161 .....	8
Two courses from Native American Studies 101, 181A, 181B, 181C, Spanish 149, or from Native American Studies 107, 188, 191 if specifically focused upon a South American language or topic .....	8
<b>Total Units for the Major, Plan III .....</b>	<b>64</b>
<b>Major Adviser.</b> D. Risling.	

### Minor Program Requirements:

The Native American Studies minor provides an introduction to the Native experience in the Americas by means of exposure to course work dealing with some of the major aspects of Indian life, including history, values, politics, literature, and art.

	UNITS
<b>Native American Studies .....</b>	<b>24</b>
Lower division requirement .....	4
Native American Studies 1 or 10 Upper division requirement .....	20

Five upper division courses, at least one of which is chosen from each of the following groups:

Ethno-History, Native American Studies 130A, 130B, or 130C

Philosophy and values, Native American Studies 156, 157, or 180

Politics and current affairs, Native American Studies 116, 117, 118, 124, or 161

Art and literature, Native American Studies 101, 181A, 181B, or 181C

## Courses in Native American Studies

### Lower Division Courses

#### 1. Introduction to Native American Studies (4) II, III. Risling

Lecture—3 hours; discussion—1 hour. Introduction to U.S. Indian tribal-reservation culture; relationships of Native American Studies to other academic disciplines.

#### 10. Native American Experience (4) I, II, III. The Staff

Lecture—4 hours. Introduction to American Indian historical and socio-cultural development with emphasis upon the U.S. area and upon those processes such as relations with non-Indians which have contributed to the current condition of Indian people. General Education credit: Contemporary Societies/Introductory.

#### 32. Native American Music and Dance (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Introduction to the music and dance of the native peoples of the U.S. Students will study secular native music and dance from a cross-section of regions and tribes.

#### 33. Native American Art in the U.S. (4) I. Longfish

Lecture—4 hours. Comprehensive survey of Indian art forms with emphasis upon design, media, and function. Intent is to familiarize the student with a wide range of styles and techniques.

#### 34. Native American Art Workshop (4) I, II, III. Longfish

Lecture—1 hour; laboratory—6 hours; to be arranged—3 hours. Prerequisite: consent of instructor; course 33 recommended. Studio projects in Native-American art, design, and crafts. (P/NP grading only.)

#### 46. Orientation to Research in Native American Studies (4) II. The Staff

Lecture-discussion—3 hours; term paper. Prerequisite: Native American Studies major or minor, or consent of instructor. Introduces students to basic research resources pertinent to Native American subjects available in the region, including libraries, archives, museums, etc. Emphasis is upon learning to use documentary resources or other collections of data. Students will carry out individual projects. Limited enrollment.

#### 55. Americanisms: Native American Contributions to World Civilization (4) II. The Staff

Lecture—4 hours. Prerequisite: course 1. Analysis and study of Americanisms: traits, inventions, and developments originated in the Americas by native peoples and adopted by other peoples.

#### 70. Native American Perception (4) I. The Staff

Lecture—4 hours. Prerequisite: course 1. Study of the culturally determined attitudes, visions, values, and relationships of American-Indian people and the differences in perception between Native Americans and the dominant society.

#### 99. Special Study for Undergraduates (1-5) I, II, III. The Staff (Forbes in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

#### \*101. Contemporary Indian Art (4) II. Longfish

Lecture—4 hours. Prerequisite: course 33. Historical review of contemporary Indian art from 1900 to the present by looking at the two art centers of Okla-

homa and Santa Fe. Social pressures that have influenced the imagery that exists today will be examined.

#### 107. Special Topics in Native American Languages (4) I, II, III. The Staff

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.

#### 112. History and Culture of the "Five Civilized Tribes" (4) I. The Staff

Lecture—4 hours. Prerequisite: upper division standing; course 1. History and culture of the Native American people, found in southeastern part of the U.S., called the "Five Civilized Tribes." Offered in odd-numbered years.

#### 116. Native American Traditional Governments (4) II. Risling

Lecture—4 hours. Prerequisite: course 1; Anthropology 2. Study of selected Native American Tribal Governments, confederations, leagues, and alliance systems. Offered in even-numbered years.

#### \*117. Native American Governmental Decision Making (4) II. Risling

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 odd-numbered years.

#### 118. Native American Politics (4) III. Risling

Lecture—4 hours. Prerequisite: course 117. 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 even-numbered years.

#### \*124. Contemporary Affairs of Native Americans in California (4) III. Risling

Lecture—4 hours. Prerequisite: course 1. Study of the contemporary problems, issues, and developments involving Native Americans, both urban and rural, in California.

#### 130A. Native American Ethno-Historical Development (4) I. Forbes

Lecture—4 hours. Prerequisite: course 1 or 10; History 17A recommended. Study of Native American ethno-history in North America before 1770's. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Native American Studies 1 or 10 or History 17A.

#### 130B. Native American Ethno-Historical Development (4) II. Forbes

Lecture—4 hours. Prerequisite: course 1; History 17A-17B recommended. Study of Native American ethno-history in North America, 1770-1890. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Native American Studies 1, 10, or 130A; or History 17A or 17B; or Anthropology 2.

#### 130C. Native American Ethno-Historical Development (4) III. Forbes

Lecture—4 hours. Prerequisite: course 1; History 17A-17B recommended. Study of Native American ethno-history in North America after 1890. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: History 17A, 17B, or Native American Studies 10. Offered in odd-numbered years.

#### 156. Native American Ethics and Value Systems (4) I. The Staff

Lecture—4 hours. Prerequisite: upper division standing; course 1. Analysis of Native American systems of values and how these values translate into actual behavior; attention to the problem of implementing traditional values in the twentieth century and the possible impact of native values in modern societies. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-Introductory.

Recommended GE preparation: Native American Studies 10.

#### \*157. Native American Religion and Philosophy (4) II. The Staff

Lecture—4 hours. Prerequisite: upper division standing; course 1 or Anthropology 2. Religious and philosophical thinking of Native American people with emphasis upon North America. Offered in odd-numbered years.

#### \*161. Native American Community Development (4) III. The Staff

Lecture—4 hours. Prerequisite: course 1; Applied Behavioral Sciences 151. Application of community development theory and techniques to the development problems of American Indian reservations and communities under the control of one or more governing bodies. Offered in odd-numbered years.

#### 171. Counseling the Native American (4) II. The Staff

Lecture—4 hours. Prerequisite: Education 163 and one course in psychology or human development; course 70 recommended. Theory and practice of counseling to reveal the subjective, cultural, and interfering differences between Native Americans and the dominant culture.

#### 180. Native American Women (4) III. Hernandez

Lecture—4 hours. Prerequisite: upper division standing; course 70 and Women's Studies 50 recommended. Social and cultural foundations of the Native American woman's personality including the development of the Indian girl and the life phases of mature womanhood. Autobiographical and biographical texts will be utilized. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Native American Studies 10 and Women's Studies 50.

#### 181A-181B-181C. Native American Literature (4-4) I-II-III. The Staff

Lecture—4 hours. Prerequisite: English 3, Comparative Literature 1, 2, 3, or any course from the General Education Literature Preparation List. Analysis of works by or about Native Americans including novels and autobiographies, analysis of Native American poetry, oral literature, songs, and tales. (A), the novel and fiction; (B), nonfiction works by native authors; (C), traditional literature and poetry. Offered in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

#### 188. Special Topics in Native American Literary Studies (4) I, II, III. The Staff

Lecture-discussion—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. Special topics drawn from Native American literature. May be repeated for credit when a different topic is studied.

#### \*190. Seminar in Native American Studies (2) III. The Staff (Forbes in charge)

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) I, II, III. Varese

Lecture-discussion—3 hours; term paper. Prerequisite: upper division standing and consent of instructor. Selected topics in Native American ethno-history, development, culture, and thought. May be repeated for credit when a different topic is studied.

#### 195. Field Experience in Native American Studies (12) I, II, III. Risling in charge

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.)

#### 196. Senior Project in Native American Studies (4) I, II, III. Risling in charge

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.

**197TC. Community Tutoring in Native American Studies** (1-5) I, II, III. The Staff (Risling in charge) 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.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Risling in charge) Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Risling in charge) Prerequisite: consent of instructor. (P/NP grading only.)

## Nematology

(College of Agricultural and Environmental Sciences) Howard Ferris, Ph.D., Chairperson of the Department Department Office, 488 Hutchison Hall (916-752-1403)

### Faculty

Edward P. Caswell, Ph.D., Assistant Professor Howard Ferris, Ph.D., Professor Scott L. Gardner, Ph.D., Assistant Professor Bruce A. Jaffee, Ph.D., Assistant Professor Harry K. Kaya, Ph.D., Professor Benjamin F. Lownsbery, Ph.D., Professor Emeritus Armand R. Maggenti, Ph.D., Professor Dewey J. Raski, Ph.D., Professor Emeritus Becky B. Westerdahl, Ph.D., Lecturer Valerie M. Williamson, Ph.D., Assistant Professor

### Minor Program Requirements:

	UNITS
<b>Nematology.....</b>	<b>18-20</b>
Nematology 100, 110, and Veterinary Microbiology 132 .....	11
Two or three courses from one of the following areas .....	7-9
(a) Plant Science: Microbiology 102, Botany 120, 121, Entomology 100, 115, 153, 156, 156L, Soil Science 111, Zoology 112, 142.	
(b) Entomology: Microbiology 102, Botany 120, 121, one upper division Entomology course, Soil Science 100, 111, Zoology 112, 142	

**Minor Adviser.** C.Y.S. Peng

**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 to the Graduate Division section in this catalog for details.

### Courses in Nematology

#### Upper Division Courses

**100. General Plant Nematology** (4) I. Ferris

Lecture—2 hours; laboratory—6 hours. Prerequisite Biological Sciences 1A or 10. An introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops.

**110. Introduction to Nematology** (2) II. Maggenti Lecture—2 hours. Prerequisite: Biological Sciences 1B or the equivalent or consent of instructor. The relationship of nematodes to man's environment. Classification, morphology, ecology, distribution, and importance of nematodes occurring in water and soil as parasites of plants and animals.

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III, summer. The Staff (Chairperson in

charge) Prerequisite: consent of instructor. (P/NP grading only.)

#### Graduate Courses

**\*20. Principles and Techniques of Nematode Taxonomy and Morphology** (4) III. The Staff

Lecture—2 hours, laboratory—6 hours. Prerequisite course 100. Analysis and evaluation of the techniques used in the collection, extraction, and preparation of specimens, free-hand and histologic sections; presentation of illustrative material. Offered in odd-numbered years.

**22. Advanced Plant Nematology** (3) II. Caswell, Jaffee, Williamson

Lecture—2 hours; laboratory—3 hours. Prerequisite course 100 or the equivalent. Review and investigation of relationship between parasitic nematodes and plants, the relationship between nematodes and their environment, and the relationship between nematodes and other biota. Biology of systems explored at the population, organism, and cellular levels. Offered in odd-numbered years.

**225. Nematode Taxonomy and Comparative Morphology** (5) II. Maggenti

Lecture—2 hours; laboratory—6 hours; 3 hours of laboratory to be announced. Prerequisite: course 220. The taxonomy, morphology, and comparative morphology of soil, freshwater, and marine nematodes as well as select plant and animal parasites Offered in even-numbered years.

**240. Biological Control in Insect and Plant Nematology** (2) I. Jaffee, Kaya

Lecture—1 hour; laboratory—3 hours or field trips Prerequisite: upper-division course in entomology, nematology, or plant pathology. Biological control potential of nematodes against insect pests and of microorganisms against nematode pests. Offered in odd-numbered years.

**245. Field Nematology** (1) I. The Staff

Fieldwork—6 days. Prerequisite: courses 100, 222. 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.)

**290. Seminar** (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

## Courses in Neurobiology

#### Graduate Courses

**200LA. Laboratory Methods in Neurobiology** (6) I, II, III. The Staff

Laboratory—18 hours. Prerequisite: graduate standing in the Neurobiology Graduate Group. Individual research in the laboratory of a faculty member. Research problems will emphasize the use of contemporary methods and good experimental design. May be repeated for credit.

**200LB. Laboratory Methods in Neurobiology** (3) I, II, III. The Staff

Laboratory—9 hours. Prerequisite: graduate standing in the Neurobiology Graduate Group. Individual research in the laboratory of a faculty member. Research problems will emphasize the use of contemporary methods and good experimental design. May be repeated for credit.

**210. Contemporary Research in Neurobiology** (3)

I. The Staff (Chairperson in charge)

Lecture—2 hours; discussion—1 hour. Prerequisite graduate standing in Neurobiology or consent of instructor. Series of lectures by faculty members presenting the intellectual and technical basis for their own research. May be repeated for credit once with consent of instructor.

**290C. Research Conference in Neurobiology** (1) I

II, III. The Staff (Chairperson in charge)

Discussion—1 hour. Prerequisite: graduate standing in Neurobiology 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.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

## Neurology

See Medicine, School of

## Neurosurgery

See Medicine, School of

## Nutrition

See Nutrition, below; Nutrition (A Graduate Group); and Nutrition Science

## Neurobiology (A Graduate Group)

Martin Wilson, Ph.D., Chairperson of the Group Group Office, 2320 Storer Hall (916-752-7468)

**Faculty.** The group includes 22 faculty members from twelve departments in the College of Agricultural and Environmental Sciences, College of Letters and Science, and the Schools of Medicine and Veterinary Medicine.

**Graduate Study.** The Graduate Group in Neurobiology offers programs of study leading to the Ph.D. degree. Neurobiology is a broad, interdepartmental program with faculty interests ranging all the way from molecular architecture of membrane channel proteins to the acquisition of song by juvenile birds. A major goal of the program is to acquaint students with the diversity of contemporary neurobiology. Details of the program may be obtained from the Group office.

**Graduate Advisers.** B. Mulloney (Zoology), P. Papadone (Animal Physiology).

## Nutrition

(College of Agricultural and Environmental Sciences)  
 Barbara O. Schneeman, Ph.D., Chairperson of the Department

Department Office, 3135 Meyer Hall (916-752-4630)

### Faculty

Kenneth H. Brown, M.D., Professor  
 Andrew J. Clifford, Ph.D., Professor  
 Kathryn G. Dewey, Ph.D., Associate Professor  
 Louis E. Grivetti, Ph.D., Professor (*Nutrition, Geography*)  
 Eunice Gwynn, Ph.D., Lecturer  
 Fredric W. Hill, Ph.D., Professor Emeritus  
 Carl L. Keen, Ph.D., Professor (*Nutrition, Internal Medicine*)  
 Bo L. Lonnardal, Ph.D., Professor (*Nutrition, Internal Medicine*)  
 Roger McDonald, Ph.D., Assistant Professor  
 Jo Ann Prophet, M.S., Lecturer  
 Robert B. Rucker, Ph.D., Professor (*Nutrition, Biological Chemistry*)  
 Barbara O. Schneeman, Ph.D., Professor (*Nutrition, Food Science and Technology, Internal Medicine*)  
 Judith S. Stern, Sc.D., Professor (*Nutrition, Internal Medicine*)  
 William C. Weir, Ph.D., Professor Emeritus  
 Frances J. Zeman, Ph.D., Professor

**Related Major Programs.** See the majors in Community Nutrition, Dietetics, and Nutrition Science.

### 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** ..... 25  
 Preparation: plan in advance to include the required course prerequisites.  
 Nutrition 101 or 110, plus 111 ..... 9  
 Nutrition 118, 119 ..... 7  
 Nutrition 120 ..... 4  
 Physiology 110 ..... 5  
 Replacement courses (see note above):  
 Nutrition 114, 116A-116B, 116AL-116BL.

#### UNITS

**Food Service Management** ..... 24-25  
 Preparation: plan in advance to include the required course prerequisites.  
 Food Science and Technology 100A-100B, 101A-101B ..... 10  
 Food Service Management 120, 120L, 121, 122 ..... 11  
 Food Service Management 123 or Agricultural Economics 112 ..... 3-4  
 Replacement courses (see note above):  
 Nutrition 10, 101, 110, 111, 114, 116A-116B, Economics 11A-11B.

#### UNITS

**Nutrition and Food** ..... 24  
 Preparation: plan in advance to include the required course prerequisites.  
 Nutrition 101, 111 ..... 9  
 Nutrition 120 ..... 4  
 Food Science and Technology 100A, 100B ..... 6  
 Physiology 110 ..... 5  
 Replacement courses (see note above):  
 Nutrition 114, 116A-116B, 116AL-116BL.

#### UNITS

**Nutrition Science** ..... 20-21  
 Preparation: plan in advance to include the required course prerequisites.  
 Biochemistry 101A-101B or Physiological Sciences 101A-101B ..... 6-7  
 Physiology 110 ..... 5  
 Nutrition 110, 111 ..... 9  
 Replacement courses (see note above):  
 Nutrition 114, 115, 116A-116B, 117, 120, 122, 122L, 123, 124, 201, 204.

**Minor Adviser.** R.B. Rucker.

**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 graduate adviser.

## Courses in Nutrition

### Lower Division Courses

**10. Discoveries and Concepts in Nutrition** (3) II, III. The Staff

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. General Education credit: Nature and Environment/Introductory. To receive GE credit, course 11 must be taken in a concurrent or subsequent quarter.

**11. Current Topics and Controversies in Nutrition**

(2) II, III. The Staff

Discussion—1 1/2 hours; oral reports, written reports, term paper. Prerequisite: course 10 (may be taken concurrently). Assigned readings and discussion of topics of current concern and broad interest in contemporary nutrition. Coordinated with course 10. Not open for credit to students who have taken an upper division course in nutrition. General Education credit: Nature and Environment/Introductory. To receive GE credit, course 10 must be taken in a concurrent or previous quarter.

**20. Food and Culture: An Introduction to Culture, Diet, and Cuisine** (4) II. Grivetti

Lecture—3 hours; discussion—1 hour. Prerequisite: Anthropology 2, Geography 2, and course 10 recommended. Historical and contemporary overview of culture, food habits, and diet; exploration of the major themes in food habit research; minority food habits; origins and development of dietary practices. General Education credit: Nature and Environment/Introductory

**\*93. Public Issues in Nutrition and Food Science**

(1) II. Schneeman, Schweigert (Food Science and Technology)

Seminar—1 hour. Faculty and invited guest speakers will present topics in the area of nutrition and food science which are currently subjects of public debate. Intended as an introduction to Nutrition and Food Science for students new to the campus. (P/NP grading only.) (Same course as Food Science and Technology 93.)

**99. Individual Study for Undergraduates** (1-5) I, II, III. The Staff

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

**101. Introduction to Nutrition and Metabolism** (4) I. Lonnardal

Lecture—4 hours. Prerequisite: Chemistry 8B; Physiology 2 or 110. Introduction to the metabolism of protein, fat, and carbohydrate; the role of vitamins and minerals; food utilization. Not open for credit to students who have taken courses 110 or 111.

**110. Principles of Nutrition** (5) II. Calvert (Animal Science) and Rucker (Nutrition); III. Hung (Animal Science) and Rucker (Nutrition)

Lecture—5 hours. Prerequisite: Physiological Sciences 101B (preferred) or Biochemistry 101B; a course in physiology or zoology. Fundamental principles of the nutrition of man and other animals. Physiological basis of nutrient requirements for growth, maintenance and production. Physiological basis of nutritional disorders.

### 111. Human Nutrition

(4) III. McDonald  
 Lecture—3 hours; discussion—1 hour. Prerequisite: course 101 or 110. Nutrition of humans; critical study of nutrient requirements at various phases of life cycle.

**112. Nutritional Assessment: Dietary, Anthropometric, and Clinical Measures** (2) III. Dewey

Lecture—1 hour; laboratory—2 hours. Prerequisite: course 101 or 111 (may be taken concurrently). Methods of nutritional assessment in humans to evaluate dietary intake (dietary records and recalls, food frequency lists), body composition (anthropometry, physiological methods), and clinical signs of malnutrition. Principles of validity and reliability and interpretation of results.

**113. Nutritional Assessment: Biochemical Measures** (2) I, II. The Staff (McDonald in charge)

Lecture—1 hour; laboratory—2 hours. Prerequisite: course 111. Variety of biologic markers of human nutritional status including hematological, urine, and hair analyses of clinical importance will be demonstrated and evaluated. Emphasizes the precision, accuracy, reliability, and interpretation of the values.

**114. Developmental Nutrition** (4) II. Keen

Lecture—4 hours. Prerequisite: course 110 or 101; course 111. Role of nutritional factors in embryonic and postnatal development.

**115. Animal Feeds and Nutrition** (4) II. Brown (Animal Science)

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 8B, Animal Science 41. Analyses and evaluation of feeds, influences of production, processing and storage methods on nutritive value of feeds. Animal nutrition. Diet formulation.

**116A-116B. Diet Therapy** (3-3) I-II. Zeman, Clifford, Stern

Lecture—3 hours. Prerequisite: course 111; Physiology 110 (or the equivalent). Biochemical and physiological bases for therapeutic diets. Problems in planning diets for normal and pathological conditions.

**116AL. Practicum in Diet Therapy** (2) I. Zeman

Lecture—1 hour; Laboratory—2 hours; extensive written assignments. Prerequisite: course 116A (may be taken concurrently). Planning and evaluation of therapeutic diets; procedures in patient education. Coordinated with course 116A. (Deferred grading only pending completion of 116AL-116BL sequence.)

**116BL. Practicum in Diet Therapy** (1) II. The Staff (Zeman in charge)

Lecture—1 hour; laboratory—1 hour; extensive written assignments. Prerequisite: course 116B (may be taken concurrently); course 116AL. Planning and evaluation of therapeutic diets; procedures in patient education. Coordinated with course 116B. Continuation of course 116AL. (Deferred grading only pending completion of 116AL-116BL sequence.)

**117. Experimental Nutrition** (5) I. Clifford

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 111; Biochemistry 101B or Physiological Sciences 101B; a laboratory course in nutrition or biochemistry. Methods of assessing nutritional status. Application of chemical, microbiological, chromatographic and enzymatic techniques to current problems in nutrition.

**118. Community Nutrition** (3) II. Dewey

Lecture—3 hours. Prerequisite: course 101 or 111; course 116A recommended. Nutrition problems in contemporary communities in the U.S. and in developing countries. Nutrition programs and policy, principles of nutrition education.

**\*119. Field Work in Community Nutrition** (4) III. Dewey

Lecture—2 hours; field work—6 hours. Prerequisite: course 118 and consent of instructor. Introduction to field work in community nutrition involving nutrition education, nutrition counseling, or community nutrition research.

**120. Food Habits and their Nutritional Implications** (4) I. Grivetti

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division or graduate standing; upper division

course in nutrition or Biochemistry 101B; course 20 recommended. Advanced themes exploring food habits and their nutritional implications; pica; toxicants naturally occurring in food; ethnic diet; food systems; dietary codes; overview and case histories.

**122. Ruminant Nutrition and Digestive Physiology**

(3) III. Morris and Macy (Animal Science)

Lecture—3 hours. Prerequisite: Physiology 110; Biochemistry 101A-101B or Physiological Sciences 101A-101B; Microbiology 2 recommended. Study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in the ruminant.

**122L. Ruminant Nutrition Laboratory** (2) III. Macy (Animal Science)

Laboratory—6 hours. Prerequisite: course 122 (concurrently). Students will conduct experiments in small groups and attend demonstrations on topics peculiar to ruminant digestive physiology and nutrition. The laboratory will deal with topics developed in lectures.

**123. Nutrition of Non-Ruminant Animals** (3) III.

Klasing (Avian Sciences)

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110 or 111. Physiological Sciences 101A-101B or Biochemistry 101A-101B; upper division standing in biological or agricultural sciences recommended. Comparative nutrition of non-ruminant animals including domestic animals, wildlife and man. Relation of nutrition to body composition, feed intake, growth, disease, exercise and stress. Discussion and laboratory exercises on the scientific method for answering questions in nutrition.

**124. Nutrition and Feeding of Finfishes and Shellfishes** (3) III. Hung (Animal Science)

Lecture—3 hours. Prerequisite: course 110 or 115. Application of principles of nutrition to feeding of finfishes and shellfishes; feeding habits, gastrointestinal anatomy, digestive physiology, aquatic environment, nutrient requirements, diet formulation and quality control, and feeding practices of commercially cultured fishes.

**129. Journalistic Practicum in Nutrition** (2) III.

Stern, Swenerton

Discussion—2 hours. Prerequisite: course 111; 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 once for credit. Offered in even-numbered years.

**190. Proseminar in Nutrition** (1) I, II, III. The Staff

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 for credit with consent of instructor. (P/NP grading only.)

**190C. Nutrition Research Conference** (1) I, II, III.

The Staff (Schneeman in charge)

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.)

**192. Internship** (1-2) I, II, III. The Staff

Laboratory—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) I, II, III. The Staff

Discussion-laboratory—3 or 6 hours. Prerequisite: Nutrition Science, Dietetics, Community Nutrition or related major. Completion of course 101 or 110 with a grade of B or better. 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.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Schneeman in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Schneeman in charge)  
(P/NP grading only.)

**Graduate Courses**

**201. Vitamin Metabolism** (2) II. Rucker

Lecture—2 hours. Prerequisite: course 110; Microbiology 2; Biochemistry 101A-101B or Physiological Sciences 101A-101B; Physiology 110. 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 emphasized.

**202. Advanced Nutritional Energetics** (2) I. Baldwin

Lecture—2 hours. Prerequisite: course 110; Physiological Sciences 101B; Physiology 110 or the equivalent. History of nutritional energetics. Evaluation of energy transformations associated with food utilization. Energy expenditures at cellular, tissue, and animal levels as affected by diet and physiological state. Current and future feeding systems.

**203. Advanced Protein and Amino Acid Nutrition**

(2) III. The Staff (Rogers, Physiological Sciences, in charge), Calvert (Animal Science)

Lecture—2 hours. Prerequisite: course 110; Physiological Sciences 101B; Physiology 110 or the equivalent. 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) III. Lonnerdal, Keen

Lecture—2 hours. Prerequisite: course 110; Microbiology 2; Biochemistry 101A-101B or Physiological Sciences 101A-101B; Physiology 110. Studies of metabolic functions and nutritional interrelationships involving minerals.

**\*212. Design and Evaluation of Nutrition Education Programs** (2) I. The Staff (Zeman in charge)

Lecture—2 hours. Prerequisite: graduate standing in nutrition. Skills and techniques of planning and evaluating nutrition programs. Emphasis on nutrition education; curricula, instructional strategies and evaluation methods in formal classroom and informal community settings. Intended for students preparing to administer programs or teach in universities or dietetic internships.

**216. Advanced Diet Therapy** (3) III. Zeman

Lecture—3 hours. Prerequisite: course 116A-116B. Nutrition and disease interrelationships at cellular, tissue, and whole body levels with emphasis on human disease. Critical evaluation of methodology in the study of nutrition in disease states.

**218. Advanced Field Work in Community Nutrition** (2-12) I, II, III, extra session summer. The Staff (Zeman in charge)

Discussion—1 hour; field work. Prerequisite: courses 118, 119; graduate standing; consent of instructor. Directed experience in community nutrition. Organization and implementation of nutrition programs.

**219. International Nutrition** (3) III. Dewey, Brown

Lecture—3 hours. Prerequisite: an upper division course in nutrition and consent of instructor; course 118 recommended. Prevalence and etiology of malnutrition world-wide, with emphasis on maternal and child health; efficacy of nutrition interventions and food aid; consideration of the complex relationships between economic development, poverty and nutrition, and options for nutrition policy and planning. Offered in even-numbered years.

**252. Nutrition and Development** (3) II. Keen

Lecture—3 hours. Prerequisite: courses 201, 202, 203. Relationship of nutrition to prenatal and early postnatal development. Offered in even-numbered years.

**253. Control of Food Intake** (3) III. Rogers (Physiological Sciences), Mendel (Animal Science), Stern (Nutrition)

Lecture—2 hours; discussion—1 hour; 2 or 3 labora-

tory demonstrations per quarter. Prerequisite: course 201 or 202 or consent of instructor. Comprehensive study of the biochemical, nutritional, behavioral, and physiological mechanisms controlling food intake. Subject matter will be approached through lectures, laboratory demonstration and discussions where students and staff will critically evaluate the literature. Offered in even-numbered years.

**254. Applications of Systems Analysis in Nutrition** (3) I. Baldwin (Animal Science)

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. Offered in odd-numbered years.

**\*255. Natural Toxicants in Foods** (2) II. Vohra (Avian Sciences)

Lecture—2 hours. Prerequisite: courses 201, 202, 203. Occurrence, mode of action and alleviation of several natural toxicants in foods and feeds. Offered in odd-numbered years.

**256. Nutritional and Hormonal Control of Animal Metabolic Function** (3) III. Baldwin (Animal Science), Freedland (Physiological Sciences)

Lecture—3 hours. Prerequisite: courses 201, 202, 203; Physiological Sciences 205A-205B. Significance and interpretation of enzyme, metabolite, in vitro and in vivo isotope tracer, energetic and other data. Critical evaluation of methodology and limitations in evaluation of animal metabolism. Diet-hormone interactions in carbohydrate, amino acid, and lipid metabolism will be discussed. Offered in odd-numbered years.

**257. Selected Topics in Nutritional and Hormonal Control of Nitrogen Metabolism** (2) I. Klasing (Avian Sciences), Calvert (Animal Science)

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. Offered in odd-numbered years.

**290. Beginning Nutrition Seminar** (1) I, II. The Staff

Seminar—2 hours. Prerequisite: first-year graduate standing. Discussion and critical evaluation of topics in nutrition with emphasis on literature review and evaluation in this field.

**290C. Research Conference** (1) I, II, III. The Staff (Schneeman in charge)

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.)

**291. Advanced Nutrition Seminar** (1) I, II, III. The Staff (Baldwin in charge)

Seminar—1 hour. Prerequisite: second-year graduate standing. Discussion and critical evaluation of advanced topics in nutrition research. (S/U grading only.)

**297T. Supervised Teaching in Nutrition** (1-3) I, II, III. The Staff (Schneeman in charge)

Teaching under faculty supervision—3-9 hours. Prerequisite: graduate status 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.)

**298. Group Study** (1-5) I, II, III. The Staff (Schneeman in charge)

**299. Research** (1-12) I, II, III. The Staff (Schneeman in charge) (S/U grading only.)

**Professional Course**

**380. Supervised Teaching in Dietetics** (2-12) I, II, III, extra-session summer. The Staff Laboratory—6-36 hours. Prerequisite: graduate standing in M.S. program in Nutrition with emphasis in dietetics; consent of instructor. Directed teaching in approved dietetic internships or coordinated program in dietetics. May be repeated for a total of 12 units; 3 units may be counted toward degree credit.

**Nutrition (A Graduate Group)**

R.L. Baldwin, Ph.D., Chairperson of the Group  
Group Office, 1151 Meyer Hall (916-752-2512)

**Graduate Study.** The Graduate Group in Nutrition offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding these programs, address the chairperson of the group.

**Graduate Advisers.** Consult the Nutrition Graduate Group Office.

**Nutrition Science**

(College of Agricultural and Environmental Sciences)

**The Major Program**

The Nutrition Science major provides organized study in nutrition and relevant biological and physical sciences as preparation for (1) graduate study in nutrition, including the nutrition of species or groups, such as human, domestic animal, avian and wildlife; (2) professional study of medicine, veterinary medicine, public health, dietetics,† and other health sciences; (3) technical work in nutrition in animal, food, and pharmaceutical industries; (4) technical writing; and (5) health education. You should consult with your adviser with respect to additional courses appropriate to your specific interest.

**B.S. Major Requirements:**

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

## UNITS

<b>Written/Oral Expression</b> .....	<b>7-8</b>
See College requirement .....	7-8
<b>Preparatory Subject Matter</b> .....	<b>59-61</b>
Biological sciences (Biological Sciences 1A, 1B, 1C) .....	15
Chemistry (Chemistry 1A-1B-1C-5; and 8A-8B or 128A-128B and 129A) .....	25-27
Computer science (Computer Science Engineering 10 or Agricultural Science and Management 21) .....	3
Mathematics (Mathematics 16A-16B) .....	6
Physics (Physics 1A-1B) .....	6
Statistics (Statistics 13 or Agricultural Science and Management 150) .....	4
<b>Breadth/General Education</b> .....	<b>24</b>
Satisfaction of General Education requirement plus additional course work in social sciences and humanities	
<b>Depth Subject Matter</b> .....	<b>26-29</b>
Biochemistry (Biochemistry 101A-101B or Physiological Science 101A-101B) .....	6-7
Nutrition 110, 111, 117 .....	14
Nutrition courses selected from 112, 113, 114, 115, 116A, 116B, 122, 122L, 123, 190, 190C, 198, and 199 .....	6-8

**Restricted Electives** ..... 42

Biochemistry laboratory (Biochemistry 101L) .....	6
Food science .....	6
Physiology with laboratory (Physiology 110, 110L, plus an additional physiology course) .....	10
Additional nutrition or related biological and physical sciences .....	20

**Unrestricted Electives** ..... 16-22**Total Units for the Degree** ..... 180

**Major Adviser.** B. L. Lonnerdal.

**Advising Center** for the major is located in 1151 Meyer Hall (916-752-2512).

**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 also the Graduate Division section in this catalog.

**Graduate Adviser.** See *Class Schedule and Room Directory*.

†To fulfill the academic requirements for an internship in Dietetics, choose the following courses from the categories in which they appear above: English 1 or 3, Psychology 1, Rhetoric and Communication 1, Sociology 1 or 3 or Anthropology 2, Economics 1A or 1B, Food Science and Technology 100A, 100B, 101A, 101B, Nutrition 110, 111, 116A, 116B, 116AL-BL, 118, 190. The following courses must be added: Agricultural Economics 112; Food Service Management 120, 120L, 121, 122, 123; Applied Behavioral Sciences 173 or Education 110 or 111. Students intending to apply for admission to a dietetic internship should contact the Advising Office no later than the first quarter of the junior year for information on procedures.

**Orthopaedic Surgery**

See **Medicine, School of**

**Otolaryngology**

See **Medicine, School of**

**Pathology**

See **Pathology (Medicine, School of); and Pathology (Veterinary Medicine), below**

**Pathology**

(School of Veterinary Medicine)

Donald L. Dungworth, B.V.Sc., Ph.D., Chairperson of the Department  
Department Office, 1126 Haring Hall (916-752-1385)

**Faculty**

Rick R. Adler, D.V.M., Ph.D., Assistant Adjunct Professor ( <i>Pathology, California Primate Research Center</i> )
Mark L. Anderson, D.V.M., Ph.D., Assistant Adjunct Professor ( <i>California Veterinary Diagnostic Laboratory</i> )
Bradd C. Barr, D.V.M., Ph.D., Assistant Adjunct Professor ( <i>California Veterinary Diagnostic Laboratory</i> )
Arthur A. Bickford, V.M.D., Ph.D., Adjunct Professor ( <i>California Veterinary Diagnostic Laboratory</i> )
Patricia C. Blanchard, D.V.M., Ph.D., Assistant Adjunct Professor ( <i>California Veterinary Diagnostic Laboratory</i> )
Donald R. Cordy, D.V.M., Ph.D., Professor Emeritus
Donald L. Dungworth, B.V.Sc., Ph.D., Professor
Robert J. Higgins, B.V.Sc., M.Sc., Ph.D., Associate Professor
Charles A. Holmberg, D.V.M., Ph.D., Associate Professor
Bill Johnson, D.V.M., Ph.D., Assistant Professor of Clinical Diagnostic Pathology ( <i>California Veterinary Diagnostic Laboratory</i> )
Peter C. Kennedy, D.V.M., Ph.D., Professor
Andrew A. Lackner, D.V.M., Ph.D., Assistant Adjunct Professor ( <i>Pathology, California Primate Research Center</i> )
Linda J. Lowenstein, D.V.M., Ph.D., Associate Professor
N. James MacLachlan, B.V.Sc., Ph.D., Associate Professor
Carol U. Meteyer, D.V.M., B.S., Assistant Professor of Clinical Diagnostic Pathology ( <i>California Veterinary Diagnostic Laboratory</i> )
F. Charles Mohr, D.V.M., Ph.D., Assistant Professor
Peter F. Moore, B.V.Sc., Ph.D., Associate Professor
Jack E. Moulton, D.V.M., Ph.D., Professor Emeritus
Harvey J. Olander, D.V.M., Ph.D., Professor
Bennie I. Osburn, D.V.M., Ph.D., Professor
Roy R. Pool, Jr., D.V.M., Ph.D., Professor
Deryck H. Read, B.V.Sc., Ph.D., Assistant Professor of Clinical Diagnostic Pathology ( <i>California Veterinary Diagnostic Laboratory</i> )
H.L. Shivaprasad, M.S., B.V.Sc., Ph.D., Assistant Professor of Clinical Diagnostic Pathology ( <i>California Veterinary Diagnostic Laboratory</i> )

**Ophthalmology**

See **Medicine, School of**

**Organizational Studies**

See **Sociology**

**Orientation**

(College of Agricultural and Environmental Sciences)

**Courses in Orientation**

Questions pertaining to the following course should be directed to the instructor or to the Biochemistry and Biophysics Department, 149 Briggs Hall.

**Lower Division Course****1. Orientation (no credit) I, II, III.** Chaykin (Biochemistry and Biophysics)

Discussion. Exploration of the philosophy, purposes, significance, expectations and mechanisms of university education. (P/NP grading only.)

Anthony A. Stannard, D.V.M., Ph.D., Professor  
(*Pathology, Medicine*)  
Dennis W. Wilson, D.V.M., M.S., Ph.D., Associate Professor

## Courses in Pathology

### Upper Division Course

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

### Graduate Courses

**\*281. Foreign Animal Diseases** (3) III. Olander Lecture—3 hours. Prerequisite: Veterinary Medicine 452, and 451 or 453. Designed for students interested in research and teaching in tropical veterinary medicine. Diseases studied are the most important ones that currently ravage Third-World countries, particularly in Africa and Latin America. (S/U grading only.) Offered in even-numbered years.

**282. Tumor Pathology** (3) II. The Staff (Dungworth in charge)

Lecture—3 hours. Prerequisite: graduate standing or final-year veterinary student and consent of instructor. The histogenesis, incidence, geographical distribution, etiology, transmission, immunity, host response, gross and microscopic structure, and metastasis of the neoplasms of domestic animals. Offered in even-numbered years.

**286A-286B-286C. Selected Topics in Advanced Special Pathology** (3-4-4) I-II-III. The Staff (Dungworth in charge)

Lecture—3-4 hours. Prerequisite: graduate standing, DVM degree, or final-year veterinary medical student. Patterns of reaction to injury of selected organ systems and differentiating morphologic characteristics of their major disease entities. Emphasis on pathogenetic mechanisms and cellular/subcellular pathology involved in inflammation, pulmonary disease, renal disease, and avian disease. Offered beginning fall quarter of even-numbered years.

**287. Comparative Pathology of Laboratory Animals** (3) III. Lowenstein

Lecture—3 hours. Prerequisite: graduate standing, DVM degree, or final-year veterinary student; consent of instructor in charge. The pathology of diseases of animals commonly kept in laboratory settings including cold-blooded vertebrates as well as rodents, lagomorphs, and non-human primates. Emphases will be recognition of lesions and understanding of pathogenesis. Offered in even-numbered years.

**290. Seminar in Veterinary Pathology** (1) I, II, III. The Staff

Seminar—1 hour. (S/U grading only.)

**291. Histopathology Conference** (1) I, II, III. The Staff (Wilson in charge)

Discussion—1 hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. Discussion of selected cases based on records and slides. Defense of diagnoses. (S/U grading only.)

**292. Surgical Pathology Conference** (1) I, II, III. The Staff (Pool in charge)

Discussion—1 hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. Diagnosis and discussion of current surgical pathology cases based on clinical records and microscopic study. (S/U grading only.)

**293. Necropsy and Surgical Pathology** (1-4) I, II, III. The Staff (Olander in charge)

Discussion—1 hour; laboratory—32 hours. Prerequisite: graduate standing; consent of instructor. Responsible diagnostic casework. Performance of necropsies, slide reading, and case reporting. (S/U grading only.)

**294. Primate Pathology Conference** (1) I, II, III. Lowenstein

Discussion—1 hour. Prerequisite: graduate standing or final-year veterinary student; consent of instructor. Discussion of selected topics in primate pathology based on currently available material. Given jointly by Departments of Pathology in the Medical and Veterinary Schools, and the California Primate Research Center. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff Group Study of advanced topics in pathology. (S/U grading only.)

**299. Research in Veterinary Pathology** (1-12) I, II, III. The Staff (S/U grading only.)

response, disposition kinetics, metabolism, mechanisms of chemico-biological interaction, and safety evaluation procedures.

**202. Effects of Drugs and Toxicants on Body Systems and Organs** (5) II. Buckpitt (Veterinary Pharmacology and Toxicology)

Lecture—3 hours; discussion—1 hour; laboratory-demonstration—3-4 hours. Prerequisite: satisfactory completion of course 201. Part two of a three consecutive quarter sequence. Mechanisms of action, pharmacologic and toxic effects, and pathologic changes produced by drugs and other chemical substances on various body systems and their associated organs.

**203. Effects of Drugs and Toxicants on Body Systems and Organs** (5) III. Stark (Pharmacology)

Lecture—3 hours; discussion—1 hour; laboratory-demonstration—3-4 hours. Prerequisite: courses 201 and 202. Part three of a three consecutive quarter sequence. Mechanisms of action, pharmacologic, toxic effects, and pathologic changes produced by drugs and other chemical substances on various body systems and their associated organs.

**230. Advanced Topics in Pharmacology and Toxicology** (1-3) I, II, III. The Staff

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.

**290. Seminar** (1) I, II, III. The Staff

Current topics in pharmacology and toxicology. (S/U grading only.)

## Pediatrics

See Medicine, School of

## Pharmacology

See Medicine, School of

## Pharmacology and Toxicology

See Pharmacology and Toxicology (A Graduate Group), below; and Veterinary Pharmacology and Toxicology

## Pharmacology and Toxicology (A Graduate Group)

\_\_\_\_\_, Ph.D., Chairperson of the Group  
Group Office, 4111 Meyer Hall (Department of Environmental Toxicology, 916-752-4516)

**Faculty.** Graduate group faculty members are based in the departments of Environmental Toxicology, Pharmacology, Veterinary Pharmacology and Toxicology, and other related departments and laboratories in the Schools of Medicine and Veterinary Medicine, and the College of Agricultural and Environmental Sciences.

**Graduate Study.** The Graduate Group in Pharmacology and Toxicology offers programs of study and research leading to the M.S. and Ph.D. degrees. For information on the program of study, contact the appropriate graduate adviser (below) or the group chairperson.

**Graduate Advisers.** C.G. Popper (*Veterinary Pharmacology and Toxicology*), G.L. Henderson (*Pharmacology*), B.W. Wilson (*Environmental Toxicology*).

## Courses in Pharmacology and Toxicology

### Graduate Courses

**201. Principles of Pharmacology and Toxicology** (5) I. Miller (Environmental Toxicology)

Lecture—3 hours; discussion—1 hour; laboratory-demonstration—3-4 hours. Prerequisite: Biochemistry 101B, Physiology 110. Part one of a three consecutive quarter sequence. General concepts underlying the metabolic fate and actions of chemicals (drugs and toxicants) in biological systems, including physicochemical properties, dose-

## Philosophy

(College of Letters and Science)

Michael V. Wedin, Ph.D., Chairperson of the Department

Department Office, 409 Surge IV (916-752-0607)

### Faculty

Ronald A. Arbini, Ph.D., Associate Professor

William H. Bossart, Ph.D., Professor

Joel I. Friedman, Ph.D., Professor

Neal W. Gilbert, Ph.D., Professor Emeritus

Marjorie Greene, Ph.D., Professor Emeritus

James R. Griesemer, Ph.D., Assistant Professor

Jean E. Hampton, Ph.D., Professor

Richard A. Healey, Ph.D., Associate Professor

Michael Jubien, Ph.D., Professor

John F. Malcolm, Ph.D., Professor

George J. Matthey II, Ph.D., Associate Professor

Michael V. Wedin, Ph.D., Professor

Richard A. Wollheim, M.A., Visiting Professor

## The Major Program

There are almost as many reasons for studying philosophy as there are students. The most common reason, however, is that philosophy examines the kinds of questions that puzzle all thinking people at some time or another in their lives: Is everything material? Is human behavior determined, or is free choice possible? Can we justify our claims to know anything? Are there objective criteria for distinguishing rational from irrational beliefs? Is there a God? Is morality merely a matter of each individual's feelings, or are there objective principles for deciding what is right or wrong? Thus, the problems studied are of interest to people, regardless of their field.

A second common reason is that thinking critically and precisely about fundamental philosophical issues can be excellent training for the intellectual rigors of any academic subject. Students rightly look on course work in philosophy as helping in the development of intellectual discipline and growth.

A third reason is that the sorts of issues philosophers raise have relevance for most fields. Virtually every

university subject, from history to computer science, poses philosophical problems when fundamental concepts or methods are discussed. The study of philosophy, then, has relevance through the range of university disciplines.

The Department of Philosophy offers courses in such areas as the theory of knowledge, metaphysics, logic, ethics, and aesthetics. In addition, upper division course work is given in the fields of philosophy of history, philosophy of mathematics, political philosophy, philosophy of religion, and philosophy of the natural and social sciences.

Philosophy is also a subject in which the problems discussed recur, or have important roots in past discussion. The history of philosophy is thus important not only as part of the heritage of educated persons, but also because it is relevant to contemporary issues. The department therefore places great emphasis on the history of philosophy, and provides courses in the major figures and traditions of western philosophy, as well as in the influential contemporary schools of the continental and analytic varieties.

Many students become sufficiently interested to major in philosophy, either with a plan to do graduate work and teach philosophy, or as background training for other professions. Philosophy majors have done extremely well in law schools and medical schools, for example. Also, many philosophy majors go on to advanced work in other academic areas in the humanities and social sciences; graduates have even been known to go into such fields as architecture and art history.

## A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>16</b>
Philosophy 12, 21, 22, 23 .....	16
<b>Depth Subject Matter</b> .....	<b>36</b>
Upper division units in Philosophy selected with approval from the major adviser .....	36
<b>Total Units for the Major</b> .....	<b>52</b>

**Major Advisers.** G.J. Matthey, J.F. Malcolm.

## 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, subject to the approval of the minor adviser. The range of choice in the logic specialization is limited to the courses listed.

	UNITS
<b>Philosophy—General</b> .....	<b>20</b>
20 upper division units in philosophy, chosen in consultation with the minor adviser. In special cases, the minor adviser may allow the substitution of lower division units for no more than 4 upper division units.	
<b>Philosophy—Logic</b> .....	<b>20</b>
Philosophy 12 or Mathematics 108 ...4	
Philosophy 112.....4	
Select units from Philosophy 131, 132, 133, 134, 135 .....	12

**Minor Adviser.** R.A. Arbini.

**Courses for Non-Majors.** The department offers a range of courses for non-majors. Philosophy 1 is a General Education course for the non-major. Students pursuing careers in agriculture and engineering might find Philosophy 5 and 10A-G especially useful, since these courses provide practice in concise and logical writing. Science and mathematics students may find these courses useful, as well as Philosophy 12, 107, 108, and 112. Pre-law students and students planning careers in medicine or the various health sciences may be interested in Philosophy 14 and 114A-114B. The offerings at the upper division level include courses of direct relevance to students in psychology, history, art, sociology, anthropology, and political science.

**Department Activities.** The Philosophy department sponsors a lecture-seminar series of well-known philosophers who present papers in their fields of expertise; and it sponsors the interdisciplinary History and Philosophy of Science lecture series. The department also operates ongoing faculty and graduate student colloquia. 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.** M. Jubien.

## Courses in Philosophy

### Lower Division Courses

**1. Introduction to Philosophy** (4) I, II, III. The Staff (Chairperson in charge)

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. General Education credit: Civilization and Culture/Introductory.

**5. Critical Reasoning** (4) I, II, III. The Staff

Lecture—3 hours; discussion—1 hour. Criteria of good reasoning in everyday life and in science. Basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation; aids to clarity. Not open to students who have completed course 6.

**\*6. Critical Reasoning and Writing** (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Criteria of good reasoning in everyday life and in science. Basic principles of deduction and induction; fallacies in reasoning; techniques and aids to reasoning; principles of scientific investigation; aids to clarity. Critical papers emphasized. Not open to students who have completed course 5.

**\*10A-G. Themes in Philosophy** (4) I, II, III. The Staff

Lecture-discussion—3 hours; papers or written reports. Introductory study of related problems in an area of philosophical interest. Sections to be offered: (A) Knowledge and Existence; (B) Self and Mind; (C) Philosophy and the Arts; (D) Morals and Politics; (E) Philosophy East and West; (F) Philosophy and Myth; (G) Science and Human Nature. General Education credit for courses 10B, 10D: Civilization and Culture/Introductory.

**12. Introduction to Logic** (4) I. Friedman

Lecture—3 hours; discussion—1 hour. Basic concepts and techniques of deductive logic with emphasis on propositional logic. Development of a deductive system for propositional logic. Translation of English into symbolic formulas.

**13. The Person** (4) II. Wollheim

Lecture—3 hours; discussion—1 hour. Examination of the concept of the person, that is, of our intuitions about what persons are, e.g., that persons are agents, that they have a distinct psychology, that they are rational, that they are language-users, that they are mortal. General Education credit: Civilization and Culture/Introductory.

**\*14. Ethical and Social Problems in Contemporary Society** (4) I. The Staff

Lecture—3 hours; term paper. Philosophical issues and positions involved in contemporary moral and social problems. Among possible topics are: civil disobedience and revolution, racial and sex discrimination, environment and population control, genetic engineering, technology and human values, sexual morality, freedom in society. General Education credit: Civilization and Culture/Introductory.

**\*17. Historical Introduction to Political Philosophy** (4) II. Hampton

Lecture—3 hours; discussion—1 hour. Introduction to problems in political philosophy through the reading of classic texts by such philosophers as Plato, Hobbes, Locke, and Marx. Problems to be discussed may include the nature of justice, the right of rebellion, and the defensibility of capitalism. General Education credit: Civilization and Culture/Introductory.

cation credit: Civilization and Culture/Introductory.

**\*18. Cosmology and Culture: Interactions between Religion and Science** (4) II. Griesemer, Janowitz (Religious Studies)

Lecture—3 hours; discussion—1 hours. Prerequisite: one lower division course in philosophy or religious studies recommended. Interdisciplinary introduction to religious and scientific cosmologies, focusing on their interplay. Primary goal of the course is to develop skills in analyzing cultural presuppositions and their fundamental role in science and religion. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any introductory GE course in philosophy or religious studies. (Same course as Religious Studies 18.)

**21. History of Philosophy: Ancient** (4) I. Malcolm

Lecture—3 hours; discussion—1 hour. Survey of Greek philosophy with special attention to the Pre-Socratics, Plato, and Aristotle. General Education credit: Civilization and Culture/Introductory.

**22. History of Philosophy: Seventeenth Century**

(4) II. Arbini

Lecture—3 hours; discussion—1 hour. Selections from Descartes, Spinoza, Leibniz, and Hobbes. General Education credit: Civilization and Culture/Introductory.

**23. History of Philosophy: Eighteenth Century** (4)

III. Matthey

Lecture—3 hours; discussion—1 hour. Selections from Locke, Berkeley, Hume, and Kant. General Education credit: Civilization and Culture/Introductory.

**\*24. Introduction to Ethics** (4) II. Hampton

Lecture—3 hours; discussion—1 hour. Reading of historical and contemporary works highlighting central problems in ethical theory. Why should we be moral? What is moral behavior? How have social ideas, class bias, and gender roles affected our conception of virtue? General Education credit: Civilization and Culture/Introductory.

**31. Appraising Scientific Reasoning** (4) III. Healey

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. General Education credit: Civilization and Culture/Introductory or Nature and Environment/ Introductory.

**98. Directed Group Study** (1-5) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III.

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

*(Certain upper division courses may not be offered every year.)*

**\*100. Founders of Modern Thought** (4) III. The Staff

Lecture-discussion—3 hours; term paper. Prerequisite: not open to philosophy majors or students who have received credit for courses 22 or 23. A survey of modern philosophy from Descartes to Kant. Major emphasis upon problems still current today.

**101. Metaphysics** (4) I. Jubien

Lecture-discussion—3 hours; term paper. 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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Philosophy 1, 22, or 23.

**102. Theory of Knowledge** (4) I. Matthey

Lecture-discussion—4 hours. Prerequisite: one course in philosophy recommended. Philosophical problems of perception and thought, memory and pre cognition, imagination, truth and error, belief and knowledge. Types of epistemology. General Education credit: Civ

lization and Culture/Non-Introductory. Recommended GE preparation: Philosophy 1, 22, or 23.

**103. Philosophy of Mind** (4) III. Friedman

Lecture-discussion—3 hours. 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.

**105. Philosophy of Religion** (4) III. The Staff

Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Logical, metaphysical, epistemological, and existential aspects of selected religious concepts and problems. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Philosophy 1 or Religious Studies 1, 2, 21, or 40.

**\*106. Science and Metaphysics** (4) I. Healey

Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy or consent of instructor. Intensive study of topics in metaphysics to which the results of modern science are or appear to be relevant: the nature of time, causation, determinism, physicalism, realism.

**107. Philosophy of the Physical Sciences** (4) I. Healey

Lecture-discussion—3 hours; term paper. 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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Philosophy 1, 22, or 23.

**108. Philosophy of the Biological Sciences** (4) III. Griesemer

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in biology or one course in philosophy. Scientific method in biology. Nature of biological theories, explanations, and models. Problems of evolutionary theory, ecology, genetics, and sociobiology. Science and human values. General Education credit: Civilization and Culture or Nature and Environment/Non-Introductory. Recommended GE preparation: (CC) any introductory GE course in philosophy; (NE) Biological Sciences 10, Botany 10, or Genetics 10.

**\*109. Philosophy of the Social Sciences** (4) II. The Staff

Lecture-discussion—4 hours. Prerequisite: one philosophy course or a social science background recommended. Nature of human action and behavior, and of explanation of behavior. Nature of laws and explanation in the social sciences. Problems in the social sciences such as: "interpretive understanding," role of prediction, behaviorism, reductionism, role of value judgments, and social rules.

**\*110. An Historical Introduction to the Philosophy of Science** (4) II. Healey

Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy. Several general topics in the philosophy of science introduced and discussed in the context of actual episodes in the development of the natural sciences. Impact of these scientific developments on philosophical thought of the immediately following historical period.

**\*111. Philosophy of Space and Time** (4) II. Healey

Lecture-discussion—3 hours; term paper. Prerequisite: one upper division philosophy course. 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.

**112. Intermediate Logic** (4) II. Healey

Lecture—3 hours; discussion—1 hour. Prerequisite: course 12 or consent of instructor. Development of the full quantifier logic, with identity and descriptions; decision procedures; advanced translation of English into the formal language; elementary theory of classes and relations; Russell's paradox.

**114A. History of Ethics** (4) I. Arbini

Lecture—3 hours; term paper. Prerequisite: one philosophy course recommended. Introduction to major writings of philosophers on central problems of right conduct; principles of obligation, responsibility, justice, the meaning of the basic terms of ethical language. Readings from such philosophers as Aristotle, Butler, Hume, Kant, Mill.

**114B. Problems of Ethical Theory and Practice** (4) III. Copp

Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Discussion of important problems of ethical theory with application to contemporary moral problems. Examples: relativism, utility and justice, act and rule utilitarianism, concept of a right, justification of punishment, the death penalty, morality of civil disobedience, abortion, war.

**\*116. Philosophy of Law** (4) III. Hampton

Lecture—3 hours; term paper. 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.

**117. Political Philosophy** (4) II. Hampton

Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Intensive examination of some central concepts of political thought such as the state, sovereignty, rights, obligation, freedom, law, authority, and responsibility. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 2.

**\*118. Philosophy of History** (4) II. The Staff

Lecture-discussion—3 hours; term paper. Survey of philosophical theories of history and an analysis of contemporary problems of historical explanation.

**121. Topics in Metaphysics** (4) II. Jubien

Lecture-discussion—4 hours. Prerequisite: course 101. Examination of up to three topics in metaphysics, e.g., fatalism; necessity; identity; ontological categories; minds, bodies, and persons; space and time; freedom and determinism.

**122. Topics in Theory of Knowledge** (4) II. Matthey

Lecture-discussion—4 hours. Prerequisite: course 102. Examination of one or more topics in theory of knowledge, such as belief, skepticism, justification.

**\*123. Aesthetics** (4) II. Wollheim

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.

**\*127. Philosophy and Economics** (4) III. Hampton

Lecture-discussion—3 hours; term paper. Prerequisite: one upper division course in philosophy. Study of issues at the intersection of economics and moral and political philosophy, e.g., the nature of value, the nature of justice, the nature of rationality, the measurability of human well-being.

**\*131. Philosophy of Logic and Mathematics** (4) II. Jubien

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 semantical paradoxes; foundations of mathematics; set theory, type theory, and intuitionistic theory; philosophy of geometry; philosophical implications of Gödel's incompleteness results.

**\*132. History of Logic** (4) II. Friedman

Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy or logic recommended. Overview of the chief developments in the history of logic.

**\*133. Survey of Advanced Logic** (4) III. Friedman

Lecture—3 hours; discussion—1 hour. Prerequisite: course 112 or consent of instructor. Survey of topics in mathematical logic includes: axiomatic logic, theory of descriptions, metalogic, models, Tarski's theory of truth, classes and relations, Russell's Paradox,

type theory and axiomatic set theory, Gödel's incompleteness theorems, computability and decidability, and nonstandard logics.

**\*134. Modal Logic** (4) III. Matthey

Lecture—3 hours; discussion—1 hour. Prerequisite: course 112 or the equivalent. Survey of the main systems of modal logic, including Lewis systems S4 and S5. "Possible worlds" semantics and axiomatic treatments. Applications to epistemology, ethics, or temporality.

**135. Alternative Logics** (4) III. Matthey

Lecture-discussion—4 hours. Prerequisite: course 12, Mathematics 108, or the equivalent. Alternatives to standard truth-functional logic, including many-valued logics, intuitionistic logic, relevance logics, and non-monotonic logics. Applications to computer science.

**\*137. Philosophy of Language** (4) II. Jubien

Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy or linguistics. Discussion of problems arising from consideration of the syntax and semantics of natural and formalized languages. Nature of linguistic rules and universals; theories of universal grammar; linguistic implications for theories of cognition.

**\*143. Hellenistic Philosophy** (4) II. The Staff

Lecture-discussion—3 hours; term paper. Prerequisite: course 21.

**\*145. Medieval Philosophy** (4) III. Malcolm

Lecture-discussion—3 hours; written reports. Prerequisite: course 21. Study of major philosophers in the medieval period.

**\*146. Renaissance Philosophy** (4) III. The Staff

Lecture-discussion—3 hours; term paper. Renaissance conceptions of man, as found in the writings of Valla, Ficino, Pico, Pomponazzi, Erasmus, Vives, and Montaigne. Some reference to current religious and social developments.

**151. Philosophy of the Nineteenth Century** (4) I. Hampton

Lecture-discussion—4 hours. Prerequisite: courses 21, 22, or 23 recommended. Idealism of Hegel, the pessimism of Schopenhauer, Marxism, the irrationality of Kierkegaard, Nietzsche and Dostoevsky. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Philosophy 1, 22, 23, History 147A or 147B.

**\*155. American Philosophy** (4) I. The Staff

Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy recommended. Study of such American thinkers as Peirce, James, Royce, Dewey, Santayana, Whitehead, and C.I. Lewis.

**\*156. Contemporary Analytic Philosophy** (4) III. The Staff

Lecture-discussion—3 hours; term paper. Prerequisite: one course in philosophy. 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.

**158. Phenomenology and Existentialism in Germany** (4) II. Bossart

Lecture—3 hours; term paper. Prerequisite: course 23 recommended. Twentieth-century German thinkers such as Husserl, Heidegger, Jaspers.

**159. Phenomenology and Existentialism in France** (4) III. Bossart

Lecture—3 hours; term paper. Prerequisite: course 23 recommended. Twentieth-century French thinkers such as Sartre, Marcel, Merleau-Ponty.

**160. Pre-Socratics** (4) III. Malcolm

Lecture-discussion—3 hours; term paper. Prerequisite: course 21. Study of the metaphysical views of such pre-Socratic figures as the Milesians, the Pythagoreans, Heraclitus, Parmenides, Empedocles, Anaxagoras, and the atomists.

**161. Plato** (4) I. Malcolm

Lecture-discussion—3 hours. Prerequisite: course 21.

**162. Aristotle** (4) II. Malcolm

Lecture-discussion—4 hours. Prerequisite: course 21 or consent of instructor.

**168. Descartes** (4) II. Friedman

Lecture-discussion—4 hours. Prerequisite: course 22.

**\*169. Spinoza** (4) III. Friedman

Lecture-discussion—4 hours. Prerequisite: course 22.

**\*170. Leibniz** (4) III. The Staff

Lecture-discussion—3 hours; term paper. Prerequisite: course 22.

**\*171. Hobbes** (4) III. Arbini

Lecture-discussion—3 hours; term paper. Prerequisite: course 22 recommended.

**\*172. Locke and Berkeley** (4) I. Mattey

Lecture—4 hours. Prerequisite: course 23. Examination of Locke's *Essay Concerning Human Understanding* and Berkeley's *Principles of Human Knowledge* and *Three Dialogues*. Topics include abstract ideas, existence of matter, primary and secondary qualities, the existence of God, and the nature of scientific knowledge.

**174. Hume** (4) III. Arbini

Lecture-discussion—4 hours. Prerequisite: course 23 recommended.

**\*175. Kant** (4) III. Mattey

Lecture-discussion—4 hours. Prerequisite: course 23.

**\*176. Kant's Ethics** (4) II. Hampton

Lecture-discussion—3 hours; term paper. Prerequisite: course 175 or one course in ethics. Intensive examination of the moral and political thinking of Immanuel Kant.

**\*177. Hegel** (4) II. Bossart

Lecture-discussion—4 hours. Prerequisite: course 23 and 175 recommended.

**190. Special Topics in the History of Philosophy**

(4) III. Hampton

Lecture—3 hours; term paper. Intensive study of special topic, problem, or authors in the history of philosophy. May be repeated for credit.

**198. Directed Group Study** (1-5) I, II, III. The Staff

(Chairperson in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates**

(1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses****201. Metaphysics** (4) III. Jubien

Seminar—4 hours.

**\*202. Theory of Knowledge** (4) I. Friedman

Seminar—4 hours.

**\*206. Philosophical Argumentation** (4) I. Arbini

Seminar—3 hours; short papers. Prerequisite: graduate standing.

Investigation and evaluation of philosophical arguments. Critical discussion of student papers on various aspects of philosophical disputes.

**\*207. Philosophy of Physics** (4) I. Healey

Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. An intensive treatment of one (or more) topic(s) in the philosophy of physics, such as foundations of spacetime theories, the interpretation of quantum mechanics, foundations of statistical mechanics. May be repeated for credit with consent of instructor.

**208. Philosophy of Biology** (4) II. Griesemer

Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. Intensive treatment of one or more general topics in the philosophy of biology, such as foundations of evolutionary theories, reductionism in biology, sociobiology, and cultural evolution. May be repeated for credit with consent of instructor.

**210. Philosophy of Science** (4) II. Healey

Seminar—3 hours; term paper. Prerequisite: graduate standing in philosophy or consent of instructor. Treatment of one or more general topics of current interest in the philosophy of science, such as scientific explanation, theories of confirmation, scientific realism, reduction in physics and biology. Course may be repeated for credit with consent of instructor.

**\*212. Philosophical Logic** (4) I. Mattey

Seminar—3 hours; term paper. Prerequisite: course 112 and Mathematics 108, or the equivalent. Uses of logic in philosophy, including applications of logic to philosophical problems and formalization of philosophical theories. Philosophical issues in logic, including the nature of logical truth, the correctness of logical systems, and the metaphysical presuppositions of logic.

**214. Ethics** (4) II. Copp

Seminar—3 hours; term paper.

**217. Political Philosophy** (4) I. Hampton

Seminar—3 hours; term paper. Prerequisite: graduate student standing. Advanced study of issues in political philosophy. May be repeated for credit with consent of instructor.

**\*261. Plato** (4) II. Malcolm

Seminar—3 hours.

**262. Aristotle** (4) III. Wedin

Seminar—3 hours.

**\*275. Kant** (4) II. Mattey

Seminar—3 hours.

**290. History of Philosophy** (4) I. Friedman; III.

Bossart

Seminar—3 hours. Special topics in the history of philosophy.

**293. The Emotions** (4) II. Wollheim

Seminar—3 hours; term paper. Prerequisite: graduate standing; open to undergraduates with consent of instructor. Considers the emotions in their full variety. Relates emotion to desire, to belief, to sensation, to behavior, and to rationality. Cultural interpretations of emotion will be reviewed. Ancient and modern writers will be read. Offered in odd-numbered years.

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)  
(S/U grading only.)**2 John W. Pappa, M.A., Supervisor**

**Marlene F. Piper, Ed.D., Associate Supervisor**  
**Melvin R. Ramey, Ph.D., Professor (Civil Engineering)**

**E. Dean Ryan, Ed.D., Professor**

**Herbert A. Schmalenberger, M.A., Supervisor**

**Joe L. Singleton, M.A., Supervisor**

**Nancy E. Slocum, M.A., Lecturer**

**James L. Sochor, Ed.D., Supervisor**

**Phillip S. Swimley, M.A., Supervisor**

**Jon E. Vochatzer, M.S., Supervisor**

**Keith R. Williams, Ph.D., Associate Professor**

**Lonnie C. Williams, M.S., Lecturer**

**Suzanne C. Williams, M.S., Supervisor**

**The Major Program**

The major in Physical Education is designed to effect a broad scholarly understanding of human movement. This is achieved primarily by completion of a core or lower division courses in the biological, physical and behavioral sciences, and a required departmental upper division core of courses. The latter are designed to develop a scientific, integrative understanding of man's acute and chronic responses to physical activity under a broad spectrum of developmental and stressor states.

The undergraduate major may select either the Bachelor of Arts or the Bachelor of Science degree program. The Bachelor of Arts is designed primarily for those students desiring a liberal arts program with a broadly based lower division curriculum. This program permits specialization in either the biological or psychological aspects of physical education, and is most appropriate for those who intend to pursue careers in coaching, teaching, or in community/corporate exercise programs, and for those intending graduate study in the behavioral aspects of sport and exercise.

The Bachelor of Science program is designed for students desiring a more intense curriculum in the natural sciences. It involves more extensive physical and life science preparation in lower division courses, and requires additional upper division course work more specific to either biomechanics or exercise physiology. This degree program provides preparation for graduate study in exercise and sport science, for careers in the allied health sciences, and for professional schools in medicine, physical therapy, and podiatry.

**A.B. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>23-24</b>
Biological Sciences 1A .....	5
Chemistry 1A .....	5
Physical Education 45 .....	3
Physics 1A .....	3
Psychology 1 or 15 .....	3-4
Statistics 13 .....	4
<b>Depth Subject Matter</b> .....	<b>47</b>
Human Anatomy 101 .....	4
Human Anatomy 101L .....	2
Physical Education 101, 102, 103, 104, 105 .....	16
Physiology 110 .....	5
Minimum of 12 upper division units in physical education chosen with approval by a major adviser .....	12
<i>Biological emphasis:</i>	1
Students electing this emphasis must select a minimum of 9 units from Physical Education 110, 111, 112, 113, 115, 117, or 118.	
<i>Psychological emphasis:</i>	1
Students electing this emphasis must select a minimum of 7 units from Physical Education 120, 121, 122, or 125.	
Minimum of 8 upper division non-physical education units in either the biological or the psychological area selected with approval by a major adviser .....	8
Students are expected to elect the above biological or psychological con-	

centration by the end of the sophomore year. Under special circumstances an individualized curriculum may be elected, but only after consultation with and approval by a major adviser. No variable-unit course work may be used to fulfill this requirement.

**Total Units for the Major** ..... 70-71

#### Recommended

Students interested in the biological emphasis of physical education are strongly urged to take Chemistry 8A, 8B.

#### B.S. Major Requirements:

UNITS

#### Preparatory Subject Matter ..... 53-59

Anthropology 1	4
Biological Sciences 1A	5
Chemistry 1A-1B or 4A-4B	10
Computer science (Computer Science Engineering 10, 30, or Engineering 5)	3
Mathematics 16A-16B or 21A-21B	6-8
Physical Education 45	3
Physics 6A-6B or 8A-8B	8
Psychology 1 or 15	3-4
Statistics 13 or 102	4

#### Additional Requirements

**Biomechanics emphasis:** Zoology 2, and Physics 6C or 8C ..... 8

**Exercise Physiology emphasis:** Chemistry 8A-8B, or 128A-128B and 129A-129B. ..6-10

#### Depth Subject Matter ..... 53

Human Anatomy 101, 101L	6
Physical Education 101, 102, 103, 104, 105	16
Physiology 110, 110L	7

#### Restricted electives ..... 24

1. Minimum of 12 upper division units from outside the major selected with adviser's approval and as specified below. (Variable-unit courses may not be used to fulfill this requirement.)

**Biomechanics emphasis:** at least 7 of the 12 units must be selected from the following: Engineering 102A, Mathematics 128A, Physiology 112, Zoology 106, 106P.

**Exercise Physiology emphasis:** at least 7 of the 12 units must be selected from the following: Physiological Sciences 101A, Physiology 112, 113, 148.

2. Minimum of 12 upper division units of Physical Education courses, including

**Biomechanics emphasis:** Physical Education 113, 115, 125.

**Exercise Physiology emphasis:** 9 units selected from Physical Education 110, 111, 112, 113, 117, 118.

**Total Units for the Major** ..... 106-112

**Honors Program** Those students with outstanding records in the major requirements may elect to enter the Honors Program with the consent of an adviser. A senior project must be completed, for which up to 10 units of Physical Education 199 (split over two quarters) may be earned. These units are taken in addition to the major requirements, and it should be realized that only a maximum of ten 199 units may be counted toward the B.S. degree total unit requirement.

**Major Advisers.** W. C. Adams, E. M. Bernauer, R. G. Holly, S.E. Jennings, P. A. Molé, E. D. Ryan, H. A. Schmalenberger, K. R. Williams.

**Teaching Major.** The teacher-training curriculum in physical education requires courses in addition to the departmental major requirements.

#### Minor Program Requirements:

UNITS

#### Physical Education ..... 18

At least 18 upper division units in physical education from one of three options ..18

#### a. Biomechanics

- 1) Physical Education 103 and one course from 101, 102, 104, 105
- 2) Minimum of two courses from Physical Education 113, 115, 125
- 3) Additional courses to complete a total of 18 upper division units.

#### b. Exercise Physiology

- 1) Physical Education 101, and one course from 102, 103, 104, 105
- 2) Minimum of three courses from Physical Education 110, 111, 112, 113
- 3) Additional courses to complete a total of 18 upper division units

#### c. Psychological Aspects

- 1) Physical Education 105, and one course from 101, 102, 103, 104
- 2) Minimum of two courses from Physical Education 120, 121, 122, 125
- 3) Additional courses to complete a total of 18 upper division units

#### Minor Advisers.

Same as major advisers  
**Teaching Credential Subject Representative.** H. A. Schmalenberger. See also the section on the Teacher Education Program.

**Graduate Study.** A program of study and research leading to the M.A. degree is available in physical education. For detailed information regarding graduate study, write to the Graduate Adviser, Department of Physical Education. See also the Graduate Division section in this catalog

**Graduate Adviser.** W.C. Adams.

**Class and Recreational Use of Facilities.** The incidental fee payable by all students at the time of registration, entitles students to the use of gymnasium, showers, towels, lockers, tennis courts, and the athletic fields. Certain equipment for games and sports is available for exercise and recreation, either with or without instruction. Lockers will be turned in on the last day of class, i.e., before the final examination period.

Fines are imposed for each formal transaction necessitated by failure of the student to comply with the regulations of the department.

#### Courses in Physical Education

##### Lower Division Courses

###### 1. Physical Education for Men and Women (1/2) I, II, III. The Staff (Chairperson in charge)

Laboratory—2 hours. Sections in: a) sports skills, rules and strategy; b) physical fitness and personal health; c) recreation; d) dance, and e) intercollegiate athletics. May be repeated for a total of 6 units. (P/NP grading only.)

###### 2. Principles of Basic Exercise Conditioning (2) I, II, III. (Swimley in charge)

Lecture—1 hour; laboratory—2 hours. A survey of the basic concepts, facts, and accepted approaches current in selected exercise training regimens, e.g., theory of aerobic function and capacity, exercise and diet in weight control, muscular strength development and maintenance, and limitations of environment, age, and gender on fitness levels. (P/NP grading only.)

###### 5. Foundations of Emergency First Aid Services (2) I, II, III. The Staff (Pappa in charge)

Lecture—1 hour; laboratory—1 hour. An introduction to the basic principles and practices that fulfill the prerequisites for advanced study in First Aid and Emergency Medical Services. Upon successful completion of course the Standard Red Cross Certificate is awarded.

###### 7. Professional Physical Education Activities: Men and Women (1) I, II, III. The Staff (Chairperson in charge)

Lecture—1 hour; 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.

###### 15. Administration of Intramural Sports (2) II. Colberg

Lecture—2 hours Planning and administering intramural sports programs at the high school and college level.

###### 25. Theory of Lifesaving and Water Safety (2) I, II, III. Hinsdale, Jahn

Lecture—1 hour; laboratory—2 hours. Prerequisite: course 5; 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.)

###### 27. Training Course for Water Safety Instructors (2) III. Hinsdale

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.)

###### 29. Basic Scuba (2) I, III. Morris

Lecture—2 hours; laboratory—2 hours. Prerequisite: good physical condition, ability to pass preliminary swim test. Introduction to basic knowledge required for scuba diving, function and maintenance of equipment, physics and physiology of diving, diver first aid and CPR, oceanography and marine life, and underwater communication. Pool and open water sessions available for certification. (P/NP grading only.)

###### 35A. Dance Composition (2) I. Bolden

Laboratory—5 hours. Prerequisite: course 1, modern jazz or jazz dance techniques, or consent of instructor. Composing phrases of movement with a knowledge of elements involved in the craft of choreography: design, dynamics, rhythm, motivation and gesture, vocabulary.

###### 35B. Dance Composition (2) II. Bolden

Laboratory—5 hours. Prerequisite: course 35A or consent of instructor. To learn the elements of dance production as it applies to the use of lighting, costume design, selection of music, and building of stage props.

###### 35C. Dance Composition (2) III. Bolden

Laboratory—5 hours. Prerequisite: courses 35A, 35B, or consent of instructor. To encourage the student to create new dance forms and prepare them for a 4-7 minute presentation in a spring concert on stage. Costumes and lighting will be created and correlated for each dance by the choreographer.

###### 36A-36B. History of Dance (3-3) I-II. Curry

Lecture—3 hours. Study of dance and its relation to culture from the primitive to the Renaissance periods. The development of dance as an art form from the Baroque period to the twentieth century.

###### 44. Principles of Healthful Living (2) I, III. Lotter, Gill

Lecture—2 hours. Application of scientific and empirical knowledge to personal, family, and community health problems. (P/NP grading only.)

###### 45. Foundations of Physical Education (3) I. Adams

Lecture—3 hours. An introduction to historical, biomechanical, physiological, psychological and sociological foundations of physical education.

**92. Physical Education Internship (2-5) I, II, III.** The Staff (Chairperson in charge)

Laboratory—6–15 hours; written project proposal and evaluation. Prerequisite: consent of instructor; enrollment dependent on availability of intern positions, with priority given to Physical Education majors. Work-learn 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 Physical Education major. (P/NP grading only.)

**97T. Tutoring in Physical Education (1-5) I, II, III.**

The Staff (Chairperson in charge)

Tutorial—1–5 hours. Prerequisite: lower division standing and consent of Department Chairperson. 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 once for credit. (P/NP grading only.)

**98. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

**99. Special Study for Undergraduates (1-5) I, II, III.**

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses****100. Field Experience in Teaching Physical Education (2) I, II, III.** The Staff (Chairperson in charge)

Discussion—1 hour; field work—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 once for credit. (P/NP grading only.)

**101. Physiological Regulation During Exercise (4)**

I. Bernauer, Molé

Lecture—3 hours; discussion—1 hour alternate weeks with laboratory—3 hours. Prerequisite: Biological Sciences 1A; Physiology 110. A study of muscle/neuromuscle, cardiovascular, body fluids, blood, acid base and respiratory metabolic regulations during acute bouts of exercise and work. Focus on physiological and environmental factors limiting capacity and causing fatigue. Role of physical activity in maintaining optimal regulatory functions.

**102. Physiological Adaptations to Exercise (2) II.**

Adams, \_\_\_\_\_

Lecture—2 hours. Prerequisite: course 101 or consent of instructor. Study of physiological capacities with reference to genotypic and adaptive aspects. Analysis of physiological adaptations to chronic physical activity and selected environmental stressors.

**103. Analysis of Human Movement (4) III. K. Williams**

Lecture—3 hours; laboratory—3 hours to alternate weekly with discussion—1 hour. Prerequisite: Human Anatomy 101 and Physics 1A; Physics 5A recommended. Anatomical and mechanical fundamentals of human motion. Qualitative and quantitative application of kinesiological principles to a variety of movement situations.

**104. Introduction to Motor Control and Skill Acquisition (3) I. K. Williams, Jennings**

Lecture—2 hours; discussion—1 hour to alternate weekly with laboratory—3 hours. Prerequisite: upper division standing; Psychology 1 or 15, and course 45. Analysis of variables affecting the ability to produce, learn, and retain movement skills. Basic neurophysiological and behavioral accounts of motor control processes are examined. Theories of movement retention and motor learning are covered.

**105. Psychosocial Factors in Motor Performance (3) I, II. Ryan**

Lecture—3 hours. Prerequisite: Psychology 1, 15, or 16. Survey of theories and experimental findings from social psychology and human motivation and their application to motor performance, including sex

differences, success and failure, expectations, anxiety, competition, and aggression.

**110. Exercise Metabolism (3) II. Molé**

Lecture—2 hours; laboratory—5 4-hour sessions. Prerequisite: courses 101, 102; Chemistry 1A. Focus on energy metabolic pathways and fuels used during different modes of exercise. Also, exercise-induced adaptations which affect metabolism and performance will be discussed. Experiments in laboratory will utilize a variety of techniques to characterize the metabolic responses to exercise.

**111. Environmental Effects on Physical Performance (3) III. Bernauer, Adams**

Lecture—2 hours; laboratory—3 hours, with discussion—1 hour (alternate weeks). Prerequisite: courses 101 and 102, 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.

**112. Clinical Exercise Physiology (4) III. Holly**

Lecture—3 hours; laboratory—3 hours to alternate weekly with discussion—1 hour. Prerequisite: courses 101 and 102, or consent of instructor. Physical activity as a therapeutic modality is examined in normal and diseased populations (cardiovascular, pulmonary, diabetic). Assessment (graded exercise testing), exercise prescription and effects of exercise conditioning are examined in detail.

**113. Growth and Development in Human Performance (3) II. Molé, Adams**

Lecture—3 hours. Prerequisite: Biological Sciences 1A, Human Anatomy 101, and Physiology 110. Development of human performance potential from conception to old age, including influence of exercise, athletic participation, and preventive medicine. Alterations in motor skill patterns, morphology, and body composition, and physiological capacities with aging.

**115. Biomechanical Bases of Movement (3) I. K. Williams**

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.

**117. Exercise and Aging in Health and Disease (3) II. Holly**

Lecture—2 hours; discussion—1 hour. Prerequisite: course 101 or 102 (concurrently) 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.

**118. Physical Fitness in the Workplace (3) III. Bernauer**

Lecture—2 hours; discussion—1 hour. Explores principles and practices of health promotion in the workplace. Established assessment procedures including validation of job standards are presented. Cost and health benefits are examined with respect to onsite and offsite programs of fitness maintenance and remediation.

**120. Sports in American Society (4) I. Gill**

Lecture—3 hours; discussion—1 hour. Historical development of sport in American society. Relationship and interaction of sport and politics, economics, religion, art, sexism, racism, and education; current trends and problems.

**121. Sports Psychology (4) III. Ryan**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 105 and Psychology 145. Consideration of major theories, research findings and methods of data collection in sport psychology through a critical examination of relevant experimental, clinical, and field data.

**122. Psychological Effects of Physical Activity (3) II. Jennings**

Lecture—3 hours. Prerequisite: Psychology 1 or 15, and 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).

**125. Neuromuscular and Behavioral Aspects of Motor Control (3) II. K. Williams, Jennings**

Lecture—2 hours; discussion—1 hour to alternate weekly with laboratory—2 hours. Prerequisite: course 104. 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.

**128A. Research Diving: 65 Feet (1) II. Bell, Morris**

Lecture—1 hour; laboratory—1/2 hour. Prerequisite: basic Scuba Certification from approved agency (course 29 or the equivalent); 10 logged open-water dives since certification; consent of instructor. Lectures in diver rescue, and resuscitation, navigation, search and light salvage, night diving, research methods, work performance under water, cold-water diving, blue-water diving, introduction to deep diving. Pool and open water sessions available for certification (contact Department Office for details). (P/NP grading only.)

**128B. Research Diving: 65 Feet (2) III. Bell, Morris**

Lecture—1 hour; laboratory—2 hours. Prerequisite: course 128A; consent of instructor. Lectures in diver rescue and resuscitation, navigation, search and light salvage, night diving, research methods, work performance under water, cold-water diving, blue-water diving, introduction to deep diving. Pool and open water sessions available for certification (contact Department Office for details). (P/NP grading only.)

**131. Physical Education for the Handicapped (4)**

II. Vochater

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 103 and consent of instructor. The role of exercise, physical retraining and remedial work in the improvement of movement for handicapped individuals.

**132. First Aid Leadership and Accident Management (3) I, II, III. Pappa**

Lecture—2 hours; students assist in teaching course 5—1 hour to be arranged. Prerequisite: course 5 or American Red Cross Advanced First Aid Card. Administration, organization and supervision of safety and first aid programs in school and community sports, recreation and all types of group activities. The study and practice of first aid leadership skills. (The American Red Cross First Aid Instructor Card will be awarded upon successful completion of the course.)

**133. Prevention and Care of Sports Injuries (3) II, III. Pappa**

Lecture—1 hour; laboratory—6 hours. Prerequisite: upper division standing; Human Anatomy 101 (may be taken concurrently). Management of the prevention, care, and rehabilitation of injuries incurred by athletes. Laboratory on anatomy, emergency care, physical therapy methods, and taping techniques.

**135. Advanced Procedures in Evaluation and Management of Athletic Injuries (4) I. The Staff (Chairperson in charge)**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 133, Human Anatomy 101, and consent of instructor. Advanced study of athletic injuries, their evaluation and management, with laboratory work in biomechanics and pathophysiology. In-depth study of selected current topics in athletic training.

**140. Principles and Theory of Physical Education (4) II. Piper, Schmalenberger**

Lecture—4 hours. Prerequisite: course 45 or consent of instructor. Critical analysis of the assumptions underlying the physical education program.

**142. Physical Education in the Public Schools (3)**

II. Schmalenberger, Piper

Lecture—3 hours. Analysis and study of the principles and methods basic to teaching physical education at the elementary and secondary levels.

**143A. Coaching Effectiveness (2)** I. Singleton

Lecture—2 hours. Prerequisite: consent of instructor. Synthesis and application of basic components of sport psychology, sport pedagogy, and sport physiology to coaching. (P/NP grading only.)

**143B. Coaching Effectiveness (2)** II. Singleton

Lecture—2 hours. Prerequisite: course 143A. Application of general principles of management and administration to athletic coaching in high school. (P/NP grading only.)

**144. Principles of Health Education (2)** I, III. Lotter

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.)

**\*145. Administration of Health/Fitness Programs (2)** III. \_\_\_\_\_

Lecture—2 hours. Principles of organizing and directing health/fitness programs. Includes selection and training of personnel, methods of evaluating personnel and programs, and elements of planning.

**146. Theory and Practice of Exercise Training (1)**

I, II, III. Holly, Jennings

Lecture-discussion—1 hour. Prerequisite: course 2 or 45 or 102. Physiological adaptations, exercise programming and behavioral techniques focusing on young and middle-aged adults. Topics include exercise prescription, nutrition, psychological effects of exercise, stress management techniques, and exercise adherence techniques. (P/NP grading only.)

**146L. Shape-Up Testing and Training Laboratory (1)**

I, II, III. Holly, Jennings

Laboratory—3 hours. Prerequisite: course 146 (may be taken concurrently). Primary activities involve leading shape-up class, attending workshops, testing sessions, and completing final reports. May be repeated once for credit. (P/NP grading only.)

**147L. Adult Fitness Training Laboratory (1)** I, II, III.

Holly, Jennings

Laboratory—3 hours. Prerequisite: courses 146, 146L, and 102 (may be taken concurrently); current CPR. Involves attending and assisting with aerobic training sessions for older adults, and assisting with physiological testing sessions. (P/NP grading only.)

**148. Theory and Practice of Exercise Testing (1)**

I, II, III. Holly

Lecture-discussion—1 hour. Prerequisite: courses 101, 102, 112 (may be taken concurrently), and 146; current CPR. 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.)

**148L. Adult Fitness Testing Laboratory (1)** I, II, III.

Holly

Laboratory—3 hours. Prerequisite: courses 146, 148 (concurrently); current CPR. 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. (P/NP grading only.)

**149L. Cardiopulmonary Rehabilitation Laboratory (1)**

I, II, III. Holly

Laboratory—3 hours. Prerequisite: courses 148 and 148L; current CPR certification. Testing and training of cardiac patients or individuals at high risk of developing heart disease. Present mini-lectures to program participants, maintain patient records, and present patients' cases in rounds. Two quarters minimum; third quarter permitted. (P/NP grading only.)

**150. Recreation in the Community (3)** III. Jahn

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 (2-12)** I, II, III.

The Staff (Chairperson in charge)

Laboratory—6-36 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 Physical Education majors. Work-learn experience in the application of physical activity programs to teaching, recreational, clinical or research situations under department faculty supervision. May be repeated for credit for total of 12 units (including course 92), but no internship units will be counted toward Physical Education major. (P/NP grading only.)

**197T. Tutoring In Physical Education (1-5)** I, II, III.

The Staff (Chairperson in charge)

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 once for credit. (P/NP grading only.)

**198. Directed Group Study (1-5)** I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)** I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of Department Chairperson. (P/NP grading only.)

**Graduate Courses****200A. Introduction to Research: History and Philosophy in Physical Education (2)** I. Molé, Bernauer

Discussion—1 hour; seminar—1 hour. Prerequisite: consent of instructor. Fundamental tenets of science and their application to current research in human performance; benchmark studies in the evolution of the field.

**200B. Problem Solving and Research Design in Physical Education (2)** III. Bernauer, Molé

Discussion—1 hour; seminar—1 hour. Prerequisite: course 200A. Conventional approaches to problem solving; processes in research design and analysis; written and oral presentation of a thesis proposal.

**201A. Sports Medicine: Medical Aspects of Sports Injuries (3)** I. Bernauer

Lecture—2 hours; laboratory—1 hour. Prerequisite: graduate students with upper division course in systemic physiology or anatomy, and medical students. Mutidisciplinary course introducing student to the pathophysiology of sports injuries, physical examination of the injured athlete, and management of sports injuries. Specific injuries, taping, and use of physical modalities will be discussed. (Same course as Physical Medicine and Rehabilitation 201A.)

**220. Research Topics in Biomechanics (3)** III. K. Williams

Lecture—2 hours; seminar—1 hour. Prerequisite: graduate standing; course 115 recommended. Survey of current research into diverse areas of biomechanics of human movement. Topics include locomotion, sport biomechanics, electromyography, musculo-skeletal and tissue mechanics, advances in measurement technology, and clinical biomechanics. Offered in even-numbered years.

**221. Anthropometry in Physical Activity (3)** III. Adams

Lecture—2 hours; laboratory—five 3-hour sessions to alternate weekly with five 1-hour discussion sessions. Prerequisite: courses 101 and 102. Consideration of physical constitution, body proportions, and body composition in man as they affect physical performance, and of body structural and compositional changes accompanying prolonged, systematic physical conditioning. Offered in odd-numbered years.

**222. Metabolic Functions in Exercise (4)** III. Molé

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 102, Physiology 114. Review of the current research literature on the metabolic responses to exercise in man; a laboratory survey of respiratory response, metabolic and water balances, blood gas adjustments and acid-base bal-

ance with particular reference to the effect of environmental conditions.

**223. Physiological Basis of Physical Fitness (2)** II. Bernauer

Seminar—2 hours. Prerequisite: graduate standing. Review and critical discussion of current research topics concerned with the physiological aspects of physical training and adaptation. Offered in even-numbered years.

**\*224. Exercise Electrocardiography (2)** I. Holly

Lecture—2 hours. Prerequisite: course 112 or consent of instructor. Physiological bases and clinical implications of normal and abnormal exercise electrocardiograms (ECG) are treated in detail. Exercise prescription is considered as is the predictive significance of normal and abnormal ECG.

**225. Seminar in Cardiac Rehabilitation (2)** II. Holly

Seminar—2 hours. Prerequisite: course 112 or graduate standing and consent of instructor. Critical examination of literature dealing with the causes, prevention and treatment of cardiovascular disease with particular emphasis on intervention through cardiac rehabilitation. Both the theoretical bases and practical approaches to cardiac rehabilitation will be examined.

**226. Measurement of the Biological Aspects of Human Performance (3)** I. The Staff (Holly in charge)

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 101; consent of instructor. Introduction to primary measurement strategies used to investigate the biological bases of human performance. Emphasis placed on the critical selection of the most valid tests and on obtaining the most accurate and reliable results.

**227. Research Techniques in Biomechanics (3)** II. K. Williams

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor; course 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 cinematography, data reduction and smoothing, body segment parameter determination, electromyography, and biomechanical modeling. (Same course as Biomedical Engineering 227.)

**\*230. Human Performance: Psychological Aspects (3)** II. Ryan

Seminar—3 hours. Prerequisite: course 105 or consent of instructor. Critical review of current literature on learning with emphasis on social learning theory and its application to clinical problems related to exercise and sport.

**232. Health Psychology: Effects of Physical Activity (3)** I. Jennings

Seminar—3 hours. Prerequisite: course 122 or consent of instructor. Analysis of research on the role of physical activity in developing, maintaining, or changing personality and affective states. Special attention will be paid to the potential effect of exercise on mental health.

**290. Seminar in Physical Education (1)** II. The Staff (\_\_\_\_\_ in charge)

Seminar—1 hour. Prerequisite: graduate standing; required of all first year students for first two quarters. Presentation and discussion of topics of interest, and the analysis of research in physical education. (S/U grading only.)

**298. Group Study (1-5)** I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing; consent of instructor. (S/U grading only.)

**299. Research (1-12)** I, II, III. The Staff (Chairperson in charge)

Prerequisite: graduate standing; consent of instructor and Department Chairperson. (S/U grading only.)

**Professional Courses****300. The Elementary Physical Education Program (2)** I. Schmalenberger, Goldbar

Lecture—1 hour; laboratory—2 hours; field trips to

selected programs. Prerequisite: senior standing or credential student. Introduction to principles, theories, material, and practices of elementary school physical education program.

### 380. Methods of Teaching Physical Education (3)

III. Schmalenberger, Goldbar

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.)

## Physical Medicine and Rehabilitation

### See Medicine, School of

## Physics

(College of Letters and Science)

Robert N. Shelton, Ph.D., Chairperson of the Department

Wendell H. Potter, Ph.D., Vice Chairperson of the Department

Department Office, 225 Physics-Geology Building (916-752-1500)

### Faculty

Robert H. Becker, Ph.D., Professor

Franklin P. Brady, Ph.D., Professor

Thomas A. Cahill, Ph.D., Professor

Ling-Lie Chau, Ph.D., Professor

Lawrence B. Coleman, Ph.D., Associate Professor

<sup>4</sup> Linton R. Corruggini, Ph.D., Professor

James E. Draper, Ph.D., Professor

Glen W. Erickson, Ph.D., Professor

Ching-Yao Fong, Ph.D., Professor

Claude Garrod, Ph.D., Professor

Kenneth R. Greider, Ph.D., Professor Emeritus

John F. Gunion, Ph.D., Professor

James P. Hurley, Ph.D., Professor Emeritus

<sup>3</sup> John A. Jungerman, Ph.D., Professor

Joseph E. Kiskis, Ph.D., Professor

William J. Knox, Ph.D., Professor Emeritus

Winston T. Ko, Ph.D., Professor

Richard L. Lander, Ph.D., Professor

Douglas W. McColm, Ph.D., Associate Professor

<sup>1</sup> Neal Peak, Ph.D., Senior Lecturer

David E. Pellett, Ph.D., Professor

Wendell H. Potter, Ph.D., Associate Professor

Roderick V. Reid, Jr., Ph.D., Associate Professor

Richard T. Scalettari, Ph.D., Assistant Professor

Robert N. Shelton, Ph.D., Professor

Rajiv R.P. Singh, Ph.D., Assistant Professor

William W. True, Ph.D., Professor

David J. Webb, Ph.D., Assistant Professor

Philip M. Yager, Ph.D., Professor

Xiangdong Zhu, Ph.D., Assistant Professor

Gergely Zimanyi, Ph.D., Assistant Professor

### The Program of Study

While many people think of physics as levers and pulleys or space shots and atomic reactors, there is much more to the realm of physics. From the smallest subatomic particles to atoms, molecules, stars, and galaxies, the study of physics is the study of what makes the universe tick. For example the working of the airplane, the paint sprayer, and the pitcher's curve ball are all understood in terms of the same physical law. Information learned from high-energy particle accelerators and nuclear reactors teaches us not only what holds the nucleus and the atom together but also why stars shine and how radiation therapy fights cancer.

As the world becomes more and more complex, the sciences appear to become more difficult to understand. Yet appearances can be deceiving, and many of the most complex phenomena and devices are easily understood and used by those with a good understanding of the basic principles of physics. A major in Physics or in Applied Physics at UC Davis provides a student with this basic knowledge, plus experience in using that knowledge, to get the most out of today's technical world.

*Careers in Physics and Applied Physics.* The science of physics involves the observation of natural phenomena and events. From these observations comes the mathematical formulation of general principles which may be tested further or applied to specific problems. Because physics is so basic to other sciences, its study provides a background with broad flexibility for later activities.

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 either physics or applied physics provides an excellent foundation for graduate work in physics. UCD physics graduates are regularly admitted to the best physics graduate departments in the country. These majors also provide 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, materials science and energy.

### The Major Programs

The Department of Physics offers three degree programs: The Bachelor of Arts in Physics, and the Bachelor of Science in Physics 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. 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 on 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.

All three are developed in a highly sequential manner, i.e., Physics 9A-9B-9C-9D and Mathematics 21A-21B-21C and 22A-22B-22C are required for most upper division courses and must be taken in the freshman and sophomore years. Some Applied Physics concentrations have additional recommended lower division courses.

In the freshman year, Astronomy 2 is recommended for the student who wishes to take a class in this department prior to enrolling in Physics 9 in the Spring Quarter. Honors mathematics is highly recommended for both the freshman and sophomore years.

Students who have completed a high school course in differential and integral calculus can finish the Physics 9 sequence during the freshman year and begin upper division physics courses in the sophomore year by taking Physics S9A in the first summer session prior to entering the University in the fall. This gives these students extra time in the junior and senior years to be used, for example, to complete a double major, to undertake interdisciplinary studies, to participate in research, or to take graduate courses in physics.

In the junior year the student normally studies mathematical methods, analytical mechanics, electricity and magnetism, and begins quantum mechanics. In the senior year the study of quantum mechanics is continued and courses in the principal modern fields

of physics are selected. Laboratory courses may be taken both years. All specifically listed physics courses required for a bachelor's degree in physics should be taken for a letter grade.

### Applied Physics

### B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b>	<b>55</b>
Physics 9A, 9B, 9C, 9D	16
Mathematics 21A, 21B, 21C, 22A, 22B, 22C	21
Engineering 5 (or equivalent programming course)	3
Chemistry 1A-1B-1C or 4A-4B-4C	15
Any recommended courses for a particular concentration	
<b>Depth Subject Matter (Common Core)</b>	<b>54</b>
Physics 104A, 104B, 105A, 105AL, 105B, 110A, 110B, 112A, 115A, 116A, 116B, 122A or 122B	36
At least 18 units from approved courses within one of the following concentrations chosen in consultation with a major adviser	18
Materials science, physical electronics, quantum optics, energy, applied nuclear physics, chemical physics, atmospheric physics, geophysics, physical oceanography. (Lists of approved courses in each concentration with representative programs are available from the Physics Department.)	
<b>Total Units for the Major</b>	<b>109</b>

### Physics

### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b>	<b>40</b>
Physics 9A, 9B, 9C, 9D	16
Mathematics 21A, 21B, 21C, 22A, 22B, 22C	21
Engineering 5 (or equivalent programming course)	3
<b>Depth Subject Matter</b>	<b>39</b>
Physics 104A, 104B, 105A, 105AL, 105B, 110A, 110B, 112A, 115A, 122A or 122B	28
At least 7 units from Physics 105BL, 105C, 110C, 112B, 115B, 127, 129A, 129B, 130A, 130B, 140A, 140B	7
At least 4 additional upper division units in physics	4
<b>Total Units for the Major</b>	<b>79</b>

### Recommended

Chemistry 1A-1B-1C or 4A-4B-4C. See also recommended elective courses following the B.S. program below.

### Physics

### B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b>	<b>55</b>
Physics 9A, 9B, 9C, 9D	16
Mathematics 21A, 21B, 21C, 22A, 22B, 22C	21
Engineering 5 (or equivalent programming course)	3
Chemistry 1A-1B-1C or 4A-4B-4C	15
<b>Depth Subject Matter</b>	<b>54</b>
Physics 104A, 104B, 105A, 105AL, 105B, 110A, 110B, 110C, 112A, 115A, 115B, 122A or 122B	34
At least 10 units from Physics 105BL, 105C, 112B, 127, 129A, 129B, 130A, 130B, 140A, 140B	10
At least 10 additional upper division units from physics. (No more than 6 units in courses numbered 194H, 195, 198, and	

199 may be applied in satisfaction of this requirement.)	10
<b>Total Units for the Major</b>	<b>109</b>

#### Recommended Electives

*Astronomy:* Astronomy 2.

*Computer and numerical analysis:* Mathematics 128A or Applied Science Engineering 115.

*Statistics:* Statistics 131A.

*Advanced mathematics:* Mathematics 108, 118A-118B, 119, 121A-121B, 127A-127B-127C, 185A-185B;

Physics 10 (history and philosophy of physics). No credit after any other physics course (except 137, 160).

**Program Variance.** Courses from other departments may be submitted for courses in the depth subject matter requirements by obtaining written permission from the Undergraduate Curriculum Committee chairperson, as approved by the Department.

**Major Advisers.** Contact Departmental Undergraduate Majors Office, 231 Physics-Geology Building, for adviser assignment.

#### Minor Program Requirements:

Three distinct minors are offered, all requiring prerequisites equivalent to Mathematics 21A-21B-21C and 22A-22B-22C and Physics 9A-9B-9C-9D. Students considering the possibility of becoming a Physics major should consult with a Physics major adviser before beginning work in one of these minor programs.

UNITS

<b>Physics</b>	<b>18-24</b>
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<b>Classical Physics</b> emphasis	<b>23</b>
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Physics 104A-104B, 105A, 105AL, 105C, 108, 108L, 110A-110B. .... 23  
(If the fall quarter courses, 104A, 105A, 110A, 112A, are taken in different years, 104A and 105A should be taken in the first year; course 105C does not require 105B.)

UNITS

<b>Quantum Physics</b> emphasis	<b>22</b>
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Physics 104A-104B, 112A, 105A, 105AL, 105B, 115A-115B. .... 22  
(Physics 104A-104B and 105A-105B must precede 115A-115B. Physics 110A recommended.)

UNITS

<b>General Physics</b> emphasis	<b>22</b>
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Physics 104A-104B, 105A, 105AL, 105B, 110A, 112A, 115A. .... 22  
(Physics 104A-104B and 105A-105B must precede 115A.)

**Graduate Study.** The Department of Physics offers programs of study and research leading to the M.S. and Ph.D. degrees and the Ph.D. degree with an Applied Physics Research Specialty. Further information regarding requirements for these three degrees, graduate research, teaching assistantships, and research assistantships may be obtained by writing to the Chairperson, Department of Physics, University of California, Davis 95616.

**Astronomy.** There is no major program leading to a degree in Astronomy. Introductory courses are offered in general astronomy and astrophysics. Students who wish to use the observatory or the portable telescopes may do so through the Astronomy Club. The graduate program in physics provides research opportunities in radio-astronomy or microwave astrophysics.

#### Courses in Astronomy

##### Lower Division Courses

###### 2. Introduction to Modern Astronomy and Astrophysics (4) I. The Staff

Lecture—3 hours; laboratory-discussion—2 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. Modern astronomical instrumentation. Gravitation, relativity, electromagnetic radiation, atomic and nuclear processes in relation to the structure and evolution of stars, the solar system, galaxies, and the Universe. Not open to students who have received credit for course 10.

###### 10. Introduction to General Astronomy (4) III. The Staff

Lecture—3 hours; laboratory-discussion—2 hours. A non-mathematical description of modern astronomy with emphasis on the structure and evolution of stars, galaxies, and the Universe. The Sun and the solar system. Optional topics include pulsars, black holes, quasars, and extra-terrestrial communications. Not open to students who have received credit for course 2 or any physics course (except 10, 137, 160). General Education credit: Nature and Environment/Introductory.

#### Courses in Physics

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 5 is a three-quarter sequence using some calculus (mostly concepts rather than calculations) and including laboratory work as an integral part. The entire sequence is recommended, rather than just 1 or 2 quarters.

Physics 9 is a four-quarter sequence using calculus throughout and including laboratory work as an integral part. The course is designed primarily for students in the physical sciences and engineering.

Note: Faculty listed for each course are well acquainted with the course, but may not teach it this year.

#### Lower Division Courses

###### 1A. Principles of Physics (3) I. McColm

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 agricultural and biological sciences and in physical education. Not open for credit to students who have completed course 5A or 9A (or former 6A or 8A).

###### 1B. Principles of Physics (3) II. McColm

Lecture—3 hours. Prerequisite: course 1A or 5A (or former 6A); and consent of instructor. Continuation of course 1A. Heat, optics, electricity, modern physics. Not open for credit to students who have completed course 5B, 5C, 9B, 9C, or 9D (or former 6B, 6C or 8B, 8C, 8D).

###### 5A. General Physics (4) I, II. The Staff

Lecture—3 hours; laboratory—2 1/2 hours. Prerequisite: Mathematics 16B (may be taken concurrently). Mechanics and fluids. Introduction to general principles and analytical methods used in physics. Primarily for biological science majors. Students who have had course 6A or 9A (formerly 8A) may not receive credit for 5A. Those who have had course 1A may receive only 2 units of credit. (Former course 6A.) (CAN Phys Seq A)

###### 5B. General Physics (4) II, III. The Staff

Lecture—3 hours; laboratory—2 1/2 hours. Prerequisite: course 5A (formerly 6A) or 1A with consent of instructor and Mathematics 16B; or Physics 9A (formerly 8A). Continuation of course 5A. Kinetic theory and thermodynamics, wave phenomena, optics. Students who have had course 9B (formerly 8C) or 6C may not receive credit for course 5B. Those who have had course 1B may receive only three units of credit. (Former course 6C.) (CAN Phys Seq A)

###### 5C. General Physics (4) I, III. The Staff

Lecture—3 hours; laboratory—2 1/2 hours. Prerequisite: course 5B (former 6C). Continuation of course

5B. Electricity and magnetism, modern physics. Students who have had course 6B or 9C (former 8B) may not receive credit for course 5C. Those who have had course 1B may receive only three units of credit. (Former course 6B.) (CAN Phys Seq A)

###### 6A. General Physics

This course has been replaced by course 5A.

###### 6B. General Physics

This course has been replaced by course 5C.

###### 6C. General Physics (4) I.

Prerequisite: course 6B. Continuation of courses 6A-6B. Effective spring 1991 replaced by course 5B.

###### 8A. Classical Physics

This course has been replaced by course 9A.

###### 8B. Classical Physics

This course has been replaced by course 9C.

###### 8C. Classical Physics

This course has been replaced by course 9B.

###### 8D. Classical Physics

This course has been replaced by course 9D.

###### 9A. Classical Physics (4) III. The Staff

Lecture—3 hours; laboratory—2 1/2 hours; discussion—1 hour. Prerequisite: Mathematics 21B. Mechanics. Introduction to general principles and analytical methods used in physics for physical science and engineering majors. Only two units of credit allowed for students who have completed course 1A. Only one unit of credit allowed for student who have completed course 5A (formerly 6A). (Former course 8A.) (CAN Phys 8)

###### 9B. Classical Physics (4) I. The Staff

Lecture—3 hours; laboratory—2 1/2 hours; discussion—1 hour. Prerequisite: course 9A (former 8A) or 5A (former 6A) with consent of instructor; Mathematics 21C; Mathematics 22C (may be taken concurrently). Continuation of course 9A. Fluid mechanics, thermodynamics, wave phenomena, optics. Not open for credit to students who have completed Engineering 105A. Only 1 unit of credit allowed to those who have completed course 5B (former 6C). (Former course 8C). (CAN Phys 10)

###### 9C. Classical Physics (4) II. The Staff

Lecture—3 hours; laboratory—2 1/2 hours; discussion—1 hour. Prerequisite: course 9B (former 8C); Mathematics 22B (may be taken concurrently). Continuation of course 9B. Electricity and magnetism including circuits and Maxwell's equations. Only one unit allowed to those who have completed course 5C (former 6B). (Former course 8B.) (CAN Phys 12)

###### 9D. Modern Physics (4) III. The Staff

Lecture—3 hours; discussion—1 1/2 hours. Prerequisite: course 9C and Mathematics 22B; Mathematics 22A recommended (may be taken concurrently). Introduction to physics since 1900. Special relativity, quantum mechanics, atoms, molecules, condensed matter, nuclei, particle physics. Only one unit of credit allowed to students who have completed course 5C (or former course 6C). (Former course 8D.)

###### 10. Basic Concepts of Physics (4) I, II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra. Survey of basic principles: motion, gravitation, electricity and magnetism, light, relativity, atoms, quanta, nuclei, elementary particles. Includes lecture demonstrations and elementary problem solving. Check with the department office for the emphasis (history/philosophy, energy/environment, natural phenomena, etc.) each quarter. Students who have had any other physics course (except 137, 160) will not receive credit for course 10. General Education credit: Nature and Environment/Introductory.

###### 98. Directed Group Study (1-5) I, II, III. The Staff

(Chair person in charge) Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

###### 99. Special Study for Undergraduates (1-5) I, II, III. The Staff

(Chair person in charge) Prerequisite: consent of instructor. (P/NP grading only.)

**Upper Division Courses****104A-104B. Introduction to Methods of Mathematical Physics** (3-3) I-II. Erickson

Lecture—3 hours. Prerequisite: courses 9B, 9C, 9D, Mathematics 22A, 22B, 22C passed with grade of C- or better, or consent of department. Elements of vector and tensor analysis, matrix methods, boundary value problems, integral transforms with applications to physics.

**105A-105B. Analytical Mechanics** (3-3) I, II. Ko

Lecture—3 hours. Prerequisite: courses 9B, 9C, 9D, Mathematics 22A, 22B, 22C passed with grade of C- or better, or consent of department. Principles and applications of Newtonian mechanics; introduction to Lagrange's and Hamilton's equations.

**105AL. Computational Laboratory In Mechanics**

(1) I. Ko

Laboratory—3 hours. Prerequisite: Engineering 5 or the equivalent; course 105A concurrently. Introduction to the application of computers to solving physics problems. Introduction to numerical and graphical methods in mechanics. (P/NP grading only.)

**105BL. Computational Laboratory In Mechanics**

(1) II. Ko

Laboratory—3 hours. Prerequisite: course 105AL; course 105B concurrently. Computer application of numerical and graphical methods in mechanics. (P/NP grading only.)

**105C. Continuum Mechanics** (3) III. Yager

Lecture—3 hours. Prerequisite: courses 104B, 105A. Continuum mechanics.

**108. Optics** (3) III. Cahill

Lecture—3 hours. Prerequisite: course 9 or 5 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.

**108L. Optics Laboratory** (1) III. Cahill

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.

**110A-110B-110C. Electricity and Magnetism** (3-3) I-II-III. True

Lecture—3 hours. Prerequisite: courses 9B, 9C, 9D, Mathematics 22A, 22B, 22C passed with a grade of C- or better; or consent of department. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves.

**112A-112B. Thermodynamics and Statistical Physics** (3-3) I-II. Corruccini

Lecture—3 hours. Prerequisite: courses 9A, 9B, 9C, 9D; Mathematics 22C; and course 105B or 115A or the equivalent. Introduction to statistical mechanics and thermodynamics.

**115A-115B. Introduction to Quantum Mechanics**

(3-3) III-I. Jungerman

Lecture—3 hours. Prerequisite: courses 104B and 105B passed with grade of C- or better, or consent of chairperson. The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics.

**116A. Electronic Instrumentation** (4) II. Pellett

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 9C, Mathematics 22B. An experimental and theoretical study of important electronic circuits commonly used in physics.

**116B. Electronic Instrumentation** (4) III. Potter

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 9D, 116A. Continuation of course 116A. Introduction to the use of digital electronics and microcomputers in experimental physics.

**121. Foundations of Atomic and Molecular Physics** (4) III. McColm

Lecture—3 hours; outside work—9 hours. Prerequisite: course 9D; Mathematics 21C. The phenomena of atomic physics; introduction to quantum phenomena and quantum mechanics; selected topics dealing with atoms, molecules, nuclei, and the solid state.

**122A. Advanced Physics Laboratory: Atomic/Solid-State** (3) I, II. Corruccini

Laboratory—8 hours. Prerequisite: course 9D. Experimental techniques and measurements in atomic and solid-state physics; e.g., spectroscopy, optical pumping, magnetic resonance, superconductivity, semiconductors, ferroelectricity. The student performs three to six experiments depending on difficulty. Individual work is stressed.

**122B. Advanced Physics Laboratory: Nuclear/High Energy** (3) I, II. Pellett

Laboratory—8 hours. Prerequisite: course 9D. Similar to course 122A with experiments in gamma-ray coincidence, Mossbauer Effect, Rutherford scattering, mean lifetime, others. Student performs three to six experiments; some of these may be chosen from course 122A.

**127. Introduction to Astrophysics** (3) III. Becker

Lecture—3 hours. Prerequisite: course 105A. Celestial mechanics, radiation, astrophysical measurements, electromagnetic processes, the sun, binary and variable stars, stellar structure and evolution, galaxies, cosmology.

**129A. Introduction to Nuclear Physics** (3) I. Brady

Lecture—3 hours. Prerequisite: course 115A. Survey of basic nuclear properties and concepts requiring introductory knowledge of quantum mechanics.

**129B. Nuclear Physics** (4) II. Knox

Lecture—3 hours; outside work—9 hours. Prerequisite: courses 115B, 129A, Continuation of course 129A.

**130A-130B. Elementary Particle Physics** (3-4) II-III. Lander

Lecture—3 hours; term paper required for 130B. Prerequisite: course 115A. Properties and classification of elementary particles and their interactions. Experimental techniques. Conservation laws and symmetries. Strong, electromagnetic, and weak interactions. Introduction to Feynman calculus.

**137. Science and Technology of Nuclear Arms Effects and Control** (3) I. Jungerman, Craig (Applied Science)

Lecture—3 hours. Prerequisite: upper division standing; one course from courses 1B, 5C, 9D, 10. Scientific and technical aspects of nuclear arms effects and nuclear arms control including nuclear physics of atomic and hydrogen bombs, blast and radiation effects radioactivity, electromagnetic pulse, ICBM accuracy, laser weapons, verification safeguards, biological and ecological effects. Emphasis on order of magnitude calculations. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Physics 10. (Same course as Applied Science Engineering 137.)

**140A. Introduction to Solid-State Physics** (3) II. Webb

Lecture—3 hours. Prerequisite: course 115A or 9D, and consent of instructor. Survey of basic concepts and classification of experimental phenomena in solids. Crystal structure, phonons, simple metals.

**140B. Introduction to Solid-State Physics** (4) III. Webb

Lecture—3 hours; outside work—9 hours. Prerequisite: course 140A. Discussions of the following: energy bands and Fermi surfaces, transport phenomena, semiconductors, ferromagnetism, magnetic resonance.

**153. Introduction to Heat Transfer** (2) II. McColm

Lecture—1 hour; outside readings and extensive problem sets. Prerequisite: courses 104A-104B, 105A-105B, 115A; 112A (may be taken concurrently). Fundamentals of conductive, convective and radiative heat transfer with an emphasis on the solution of practical problems involving the combined modes of conduction and convection. Viscous fluid dynamics pertinent to convective heat transfer.

**160. Environmental Physics and Society** (3) I. Jungerman

Lecture—3 hours. Prerequisite: course 9D or 5C; 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 sci-

ences. Calculations based on physical principles will be made, and the resulting policy implications will be considered. (Same course as Engineering 160.) General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Physics 10.

**194H. Special Study for Honors Students** (4) I, II, III. The Staff (Chairperson in charge)

Prerequisite: open only to seniors who qualify for the honors program. Independent research and/or reading on selected topics.

**195. Senior Thesis** (5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: physics major or 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 16 units and for no more than 5 units in any one quarter without Departmental approval.

**197T. Tutoring In Physics and Astronomy** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor and department chairperson. Tutoring of students in lower division course. Weekly meetings with instructor. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates**

(1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses****200A. Theory of Mechanics and Electromagnetics**

(3) I. Yager

Lecture—3 hours. Prerequisite: courses 104B, 105B, and 110C or the equivalent; course 204A (concurrently). Special theory of relativity, covariant formulation of mechanics and electromagnetic theory, Lagrange's equations, variational principles for discrete and continuous mechanical and electromagnetic systems.

**200B. Theory of Mechanics and Electromagnetics**

(3) II. Yager

Lecture—3 hours. Prerequisite: course 200A; course 204B (concurrently). Hamilton's equations. Hamilton-Jacobi theory and contact transformations, action-angle variables and perturbation theory, selected topics in mechanics of continuous media; incompressible and compressible flow, gravity waves and shock theory.

**200C. Theory of Mechanics and Electromagnetics**

(3) III. Hurley

Lecture—3 hours. Prerequisite: course 200B. Brief review of static electromagnetic fields; Maxwell's equations; plane waves in various media; magneto-hydrodynamics.

**200D. Theory of Mechanics and Electromagnetics**

(3) I. Hurley

Lecture—3 hours. Prerequisite: course 200C. Diffraction theory. Radiating systems and electron theory.

**204A-204B. Methods of Mathematical Physics** (3-3) I-II. Erickson

Lecture—3 hours. 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.

**215A. Quantum Mechanics** (3) I. Chau

Lecture—3 hours. Prerequisite: course 115B. Nonrelativistic quantum mechanics. Formal development and interpretation of quantum mechanics, including the Schrödinger wave equation, matrix mechanics, and use of state vectors in describing a dynamical system.

**215B. Quantum Mechanics** (3) II. Reid

Lecture—3 hours. Prerequisite: course 215A. Wave packets, Wentzel-Kramers-Brillouin approximation, and perturbation methods applied to atomic, nuclear, molecular, and solid-state problems.

**215C. Quantum Mechanics (3) III. Reid**

Lecture—3 hours. Prerequisite: course 215B. Scattering theory, radiation theory, and a brief introduction to relativistic quantum mechanics and the Dirac equation.

**219A. Statistical Mechanics (3) I. Garrod**

Lecture—3 hours. Prerequisite: courses 112B and 115B. Foundations of classical and quantum statistical mechanics.

**219B. Statistical Mechanics (3) II. Garrod**

Lecture—3 hours. Prerequisite: course 219A. Applications to properties of solids, real gases, nuclear matter, fluctuations about the equilibrium state.

**\*221. Atomic Physics (3) III. McColm**

Lecture—3 hours; seminar—1-2 hours. Prerequisite: course 215A-215B. Term structure of atoms using the angular momentum formalism; methods of computing wave functions and radial integrals; splitting in external fields; term structure in crystals; scattering and collisions. Not offered every year.

**223. Group-Theoretical Methods of Physics (3) III. Kiskis**

Lecture—3 hours. Prerequisite: courses 215A-215B-215C or consent of instructor. Theory of groups and their representations with applications in selected areas of physics.

**224A. Nuclear Physics (3) II. Draper**

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.

**224B. Nuclear Physics (3) III. Draper**

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.

**224C. Nuclear Physics (3) I. Draper, Brady**

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.

**\*229A. Advanced Nuclear Theory (3) II. Brady**

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. Not offered every year.

**\*229B. Advanced Nuclear Theory (3) III. Brady**

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. Not offered every year.

**230A. Quantum Theory of Fields (3) I. Gunion**

Lecture—3 hours. Prerequisite: course 215C. Relativistic quantum mechanics of particles; techniques and applications of second quantization; Feynman diagrams; renormalization.

**230B. Quantum Theory of Fields (3) II. Gunion**

Lecture—3 hours. Prerequisite: course 230A. Continuation of 230A, with selected advanced topics, such as S-matrix theory, dispersion relations, axiomatic formulations.

**239A. Quantum Many-Body Systems (3) II. Garrod**

Lecture—3 hours. Prerequisite: courses 215C and 219B. The quantum theory of many-particle systems. Theoretical analysis of superfluids, superconductors, and nuclear matter. Not offered every year.

**239B. Quantum Many-Body Systems (3) III. Garrod**

Lecture—3 hours. Prerequisite: course 239A. Perturbation and variation techniques in many-particle systems. Band theory of solids, electron-phonon interactions, and other topics. Not offered every year.

**240A-240B-240C. Solid-State Physics (3-3) II-III-I. Fong**

Lecture—3 hours. Prerequisite: courses 215A-215B-215C and 140A. One electron model of solids; transport properties; optical properties; properties of lattice waves; electron-phonon interaction; superconductivity; magnetism; non-crystalline solids.

**245A. High Energy Physics (3) II. Pellett**

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.

**245B. High-Energy Physics (3) III. Ko**

Lecture—3 hours. Prerequisite: course 245A. Electroweak interactions; phenomenology of the Standard Model of  $SU(2)_L \times U(1)$ ; 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.

**245C. High-Energy Physics (3) III. Gunion**

Lecture—3 hours. Prerequisite: course 245A. Strong interaction: quantum chromodynamics phenomenology; jets and other experimental tests; quark and gluon distribution functions; quark and gluon scattering; applications of the renormalization group. Not offered every year.

**250. Special Topics in Physics (3) I, II, III. The Staff**

Lecture—3 hours. Prerequisite: consent of instructor. Topic varies from year to year. May be repeated three times for credit. Not offered every quarter.

**\*251. Special Topics in Applied Physics (3) I, II, III. The Staff**

Lecture—3 hours. Prerequisite: consent of instructor. Topic varies from quarter to quarter. May be repeated three times for credit. Not offered every quarter.

**252A. Techniques of Experimental Physics (3) III. Potter**

Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from condensed matter will be utilized.

**252B. Techniques of Experimental Physics (3) III. Lander**

Lecture—3 hours. Introduction to techniques and methods of designing and executing experiments. Problems and examples from nuclear and particle research will be utilized.

**290. Seminar (1-3) I, II, III. The Staff (Chairperson in charge)**

Seminar—1-3 hours. (S/U grading only.)

**291. Seminar in Nuclear Physics (1-2) I, II, III. The Staff (Chairperson in charge)**

(S/U grading only.)

**292. Seminar in Elementary Particle Physics (1-2) I, II, III. The Staff (Chairperson in charge)**

Seminar—1-2 hours. Prerequisite: graduate standing in Physics. Presentation and discussion of any topic of current research interest in experimental or theoretical particle physics. Topics vary weekly. (S/U grading only.)

**293. Seminar in Solid-State Physics (1-2) I, II, III. Fong, Potter**

Seminar—1-2 hours. (S/U grading only.)

**294. Seminar in Applied Physics (1-2) I, II, III. The Staff (Chairperson in charge)**

Seminar—1-2 hours. Presentation and discussion of current topics in applied physics by visiting lecturers, staff, and students. (S/U grading only.)

**295. Introduction to Departmental Research (1) I. The Staff (Chairperson in charge)**

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.)

**297. Techniques of Teaching Physics (3) III. Greider**

Prerequisite: consent of instructor and Department Chairperson. Study of devices and methods used to teach physics at the college level. Participation in presenting lectures and demonstrations in undergraduate classes. Preparation of new material for lectures and laboratories. (S/U grading only.)

**298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: consent of instructor. (S/U grading only.)

**299. Research (1-12) I, II, III. The Staff (Chairperson in charge)**  
(S/U grading only.)

**Professional Course****390. Methods of Teaching Physics (1) I, II, III. The Staff**

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.)

## Physiological Sciences

(School of Veterinary Medicine)

Richard A. Freedland, Chairperson of the Department

Department Office, 1094 Haring Hall (916-752-1373)

**Faculty**

Arthur L. Black, Ph.D., Professor

Michael L. Bruss, D.V.M., Ph.D., Associate Professor

Victor W. Burns, Ph.D., Professor Emeritus

Charles E. Cornelius, D.V.M., Ph.D., Professor

Donald L. Curry, Ph.D., Professor

Richard A. Freedland, Ph.D., Professor

Robert J. Hansen, Ph.D., Professor

Benjamin L. Hart, D.V.M., Ph.D., Professor

Alfred A. Heusner, Docteur-ès-Sciences, Professor

James H. Jones, Ph.D., D.V.M., Assistant Professor

James G. Morris, Ph.D., Professor

Stuart A. Peoples, M.D., Professor Emeritus

Quinton R. Rogers, Ph.D., Professor

## Courses in Physiological Sciences

**Upper Division Courses****101A-101B. Physiological Chemistry (4-3) I-II. Hansen**

Lecture—4-3 hours. Prerequisite: organic chemistry. Recommended: a course in physiology (may be taken concurrently) and quantitative analysis. Chemical and physical properties of substances comprising the animal body, with major emphasis on the changes during metabolism and factors influencing these reactions. Biochemistry of the endocrine glands and other specialized tissues and body fluids; chemistry of respiration, energy metabolism and nutrition.

**199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)****Graduate Courses****205A. Intermediary Metabolism of Animals (4) I. Freedland, Baldwin (Animal Science); Schneeman (Nutrition)**

Lecture—4 hours. Prerequisite: a course in biochemistry or physiological chemistry or consent of instructor; a course in physiology recommended. Biochemical data as related to metabolism of intact animals. Pathways and control in biosynthesis and degradation of carbohydrates and lipids; including hormonal, nutritional, and genetics effects. Dynamics of animal metabolism including pools and turnover rates. Offered in even-numbered years.

**205B. Intermediary Metabolism of Animals (3) II. Rogers, Hansen, Hershey (Biological Chemistry), Rucker (Nutrition)**

Lecture—3 hours. Prerequisite: course 205A or consent of instructor. Pathways and control in animals of the biosynthesis and degradation of amino acids,

proteins, nucleotides and porphyrins; includes hormonal, nutritional, and genetic effects. Offered in odd-numbered years.

**220. Physiology of the Liver** (3) I. Bruss, Cornelius Lecture—2.6 hours; laboratory—1.2 hours. Prerequisite: systemic physiology; biochemistry or physiological chemistry; or consent of instructor. Topics in functional morphology, physiology, intermediary metabolism, pharmacology, and disorders of the liver. Emphasis on bile formation; bile pigments; bile acids; drug and toxin metabolism; circulation; carbohydrate, lipid and protein metabolism; ion transport; and function tests. Offered in odd-numbered years.

**230. The Secretory Process** (2) I. Curry Lecture—2 hours. Prerequisite: graduate standing or consent of instructor. Structural and intracellular events involved in secretion with emphasis on physiological initiators and modifiers. All secretory systems, but emphasis on the beta cell of the endocrine pancreas as role model. Offered in odd-numbered years.

**238. Behavioral Adaptations to Parasites and Pathogens** (3) I. Hart

Lecture—3 hours. Prerequisite: graduate standing and upper division course in animal behavior or consent of instructor. Examination of the ways in which animals use behavioral strategies to avoid debilitating viral, bacterial and parasitic diseases, or to overcome such diseases once they are sick. Main emphasis is on vertebrates, especially wild and domestic mammals. Offered in even-numbered years.

**243A-243B. Use of Isotopes as Tracers in Biological Research** (2-2) I-II. Bruss

Lecture—2 hours. Prerequisite: biochemistry or physiological chemistry, elementary physics and calculus or consent of instructor. Discussion of the properties of isotopes and their use as tracers in biological systems.

**\*243L. Laboratory in Use of Isotopes as Tracers in Biological Research** (2) II. Burns

Laboratory—6 hours. Prerequisite: course 243A-243B (concurrently). Study of radioisotope properties, uses, and measurement methods relevant to the biological sciences.

**260. Comparative Bioenergetics** (4) II. Heusner

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 107A. Fundamentals of thermodynamics and their application in physiology; entropy, probability, information, and thermodynamic potentials. Theory of biological similarity; dimensional analysis, poikilothermy, heterothermy, homeothermy, and biological time. Offered in even-numbered years.

**280. Advanced Respiratory Physiology** (4) II.

Jones Lecture—3 hours; discussion—1 hour. Prerequisite: graduate student status or consent of instructor. Advanced study of respiratory physiology with emphasis on principles of ventilation and perfusion, gas distribution, exchange, transport, and delivery at rest, during exercise, and at high altitude. Offered in even-numbered years.

**290. Seminar** (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour.

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

### Professional Course

**397T. Tutoring in Physiological Sciences** (1-5) I, II, III. The Staff

Prerequisite: graduate or professional student standing and consent of instructor. Designed for graduate or professional students who desire teaching experience, but are not teaching assistants. (S/U grading only.)

## Physiology

**See Animal Physiology; Human Physiology (School of Medicine); Physiology (below); and Plant Physiology**

## Physiology

(College of Agricultural and Environmental Sciences)

### Faculty

See under Departments of Animal Physiology, Animal Science, and Avian Sciences.

### The Major Program

The Physiology major is designed to provide an understanding of the vital functions of living organisms and includes a systematic study of the functional properties of tissues and organs and comparison of processes among different kinds of animals. It will provide the foundation for a challenging career in physiology and also serve as a basis for further training in schools of human and veterinary medicine, medical technology, pharmacy, dentistry, optometry, and other health sciences. Students interested in research and advanced teaching may use the program as preparation for continued study leading to advanced degrees.

### Choice of College

The Bachelor of Science degree is offered in both the College of Agricultural and Environmental Sciences and College of Letters and Science.

Students majoring in Physiology in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

### B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>61-68</b>
Biological Sciences 1A, 1B, 1C .....	15
Chemistry 1A-1B-1C and 5 (or 4A-4B-4C); 8A-8B (or 128A-128B) .....	21-25
Mathematics 16A-16B-16C (or 21A-21B-21C) .....	9-12
Physics 6A-6B-6C .....	12
Statistics 13 (or 102) .....	4

### Depth Subject Matter

Physiology Core Requirements:	
Physiology 100A, 100B, 100L .....	8
Physiology 110, 110L .....	7
Physiology 111A or 111B or 111C .....	3
Additional Physiology Depth Unit Requirements .....	9
Courses 106A, 106B, 190, 190C, 196A, 196B, 197, 198, 199 may not be used to meet Physiology Depth Requirements.	

### Restricted Electives

Upper division science units to include:	
a. <i>Biochemistry Requirement:</i>	
Physiological Sciences 101A-101B or Biochemistry 101A-101B	
b. <i>Morphology Requirement:</i>	
Human Anatomy 101, 101L; or Zoology 100-100L or Zoology 122; or Anatomy 100-100L; or Anthropology 155	

Courses 106A, 106B, 190, 190C, 196A, 196B, 197, 198, 199 may not be used for Restricted Electives.

### Breadth Subject Matter

Refer to appropriate College section for a description of requirements to be completed in addition to those for the major.

**Total Units for the Major** ..... 104-111

**Master Adviser.** E.E. Carstens.

**Advising Center.** 196 Briggs Hall (916-752-9696)

**Graduate Study.** The Graduate Group in Physiology offers programs of study and research leading to the M.S. and Ph.D. degrees. Information on graduate study may be obtained by writing the Graduate Adviser, Department of Animal Physiology. See also the Graduate Division section in this catalog.

## Courses in Physiology

### Lower Division Courses

#### \*2. Introductory Physiology

(4) III. The Staff Lecture—4 hours. Prerequisite: Biological Sciences 1A. Physiology of muscular contraction, nervous integration, sensation, circulation, respiration, excretion, and digestion.

#### \*2L. Introductory Physiology Laboratory

(2) III. The Staff Laboratory—6 hours. Prerequisite: course 2 (completed or in progress).

#### \*10. Elementary Physiology

(4) III. The Staff Lecture—3 hours; discussion—1 hour. Prerequisite: not open for credit to students who have had Biological Sciences 1A. Introductory course in physiology for nonscience majors.

### Upper Division Courses

#### 100A. General Physiology

(3) I. Horwitz Lecture—3 hours. Prerequisite: Biological Sciences 1A and Chemistry 8B. Interaction of intracellular compartments in the functioning of animal cells. The metabolic basis and regulation of cellular function. Relation of cell and tissue structure to physiological mechanisms.

#### 100B. General Physiology

(3) II. Pappone Lecture—3 hours. Prerequisite: course 100A; Physics 5C recommended. Continuation of course 100A, with emphasis on transport processes, generation and communication of information between the environment and cells and between cells. Cellular aspects and immune-system function.

#### 100L. General Physiology Laboratory

(2) II. Horwitz, Horwitz Discussion—five 2-hour sessions to alternate weekly with laboratory—five 6-hour sessions. Prerequisite: course 100A; course 100B (concurrently); or consent of instructor. Experiments in the physical and chemical processes of cells and tissues.

#### 106A. Experiments in Physiology: Design and Execution

(3) I. The Staff (Barkley in charge) Discussion—total of 6 hours; laboratory—7-9 hours Prerequisite: course 100A, 100B, 100L; consent of instructor. Allows students to experimentally examine current physiological problems. Following group discussions on approaches to designing experiments, groups of 2-3 students will choose a project and design an experimental protocol that they will then carry out and report upon. (P/NP grading only.)

#### 106B. Experiments in Physiology: Design and Execution

(3) II. The Staff (Barkley in charge) Discussion—two 2-hour meetings during quarter; laboratory—9 hours. Prerequisite: course 106A and consent of instructor. Continuation of course 106A. (P/NP grading only.)

#### 110. Systemic Physiology

(5) I, II, III. Barkley, Fuller, Ishida, Sillman, Weidner Lecture—5 hours. Prerequisite: Biological Sciences 1A; Physics 1B or 5C recommended. Organ systems. Concepts of integrative and homeostatic mechanisms.

**110L. Systemic Physiology Laboratory (2)** I. Ishida; III. Adamson

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 110 prior to taking 110L recommended, but 110 may be taken concurrently. Selected experiments to illustrate functional characteristics of organ systems discussed in course 110.

**111A. Advanced Systemic Physiology Laboratory (3)** I. Adamson

Lecture—1 hour; discussion—five 2-hour sessions to alternate weekly with laboratory—five 6-hour sessions. Prerequisite: courses 110, 110L; courses 113, 114 recommended. Selected comprehensive experiments on the cardiovascular, respiratory, digestive, and endocrine systems. Emphasis on conceptual and methodological approaches using several species in demonstrating the physiology of organ systems.

**111B. Advanced Systemic Physiology Laboratory (3)** II. Adamson

Lecture—1 hour; discussion—five 2-hour sessions to alternate weekly with laboratory—five 6-hour sessions. Prerequisite: courses 110, 110L; course 112 recommended. Course 111A is not a prerequisite for course 111B. Selected comprehensive experiments on the nervous and muscular systems. Emphasis on conceptual and methodological approaches using several species in demonstrating the physiology of organ systems.

**111C. Advanced Systemic Physiology Laboratory (3)** III. Adamson

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 110, 110L, 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.

**112. Neuroscience (3)** I. Horowitz, Carstens

Lecture—3 hours. Prerequisite: course 110. Advanced presentation of concepts in neuroscience including sensory systems, motor systems, and higher neural integration.

**113. Cardiovascular, Respiratory, and Renal Physiology (4)** II. Goldberg, Weidner

Lecture—4 hours. Prerequisite: course 110; Chemistry 8B, Physics 5B recommended. An intense and advanced presentation of concepts in cardiovascular, respiratory, and renal physiology including discussion of acid-base balance. Recommended for Physiology students, graduate students, and others in allied interests.

**114. Gastrointestinal Physiology (3)** III. Mendel

Lecture—3 hours; term paper. Prerequisite: course 110; Biochemistry 101B or Physiological Sciences 101B recommended. Advanced gastrointestinal physiology covering absorption, secretion, motility, and special emphasis on endocrinology and innervation. Emphasis will be on physiology of the gastrointestinal tract; some pathology and nutritional items will be covered.

**\*117. Avian Physiology (3)** III.

Lecture—3 hours. Prerequisite: course 110 or Biological Sciences 1B. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and endocrine system.

**120A. Comparative Physiology: Neurointegrative Mechanisms (3)** III. Woolley

Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom: neurointegrative mechanisms of integration including aspects of phylogenetic development at both neuronal and systemic levels.

**120B. Comparative Physiology: Circulation (3)** III. Goldberg

Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom: circulation. Comparative approach to cardiovascular function in vertebrates and invertebrates.

**\*120C. Comparative Physiology: Digestion (3)** III. Colvin

Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal king-

dom; digestion. Offered in even-numbered years.

**120D. Comparative Physiology: Endocrinology (3)** II. Mendel

Lecture—3 hours. Prerequisite: course 110. Comparison of physiological functions in the animal kingdom: animal hormones and their functions.

**\*120E. Comparative Physiology: Respiration (3)** II. Cech

Lecture—3 hours. Prerequisite: course 110. Comparisons of physiological functions in the animal kingdom: respiration. Offered in even-numbered years.

**120F. Comparative Physiology of Sensory Systems (3)** II. Sillman

Lecture—3 hours. Prerequisite: course 110. Basic physiological mechanisms involved in sensory systems. Comparative approach to considerations of mechano-sensitive systems (audition, lateral lines, touch, echo location, equilibrium), chemosensitive systems (olfaction, taste, pheromones), photosensitive systems (vision, infrared detection, UV detection), electoreception, and pain. Emphasis on receptors.

**121. Physiology of Reproduction (3)** II. Anderson

Lecture—3 hours. Prerequisite: course 110. Physiological mechanisms related to reproduction, breeding efficiency, and fertility, with special reference to domestic animals.

**121L. Physiology of Reproduction Laboratory (1)** II. Anderson

Laboratory—3 hours. Prerequisite: course 121 (may be taken concurrently) recommended. Experiments on the reproductive systems of domestic animals including male and female gametes. (P/NP grading only.)

**130. Physiology of the Endocrine Glands (4)** I. Moberg

Lecture—4 hours. Prerequisite: course 110. Advanced presentation of concepts in endocrinology with emphasis on the role of hormones in reproduction, metabolism, and disease.

**147. Aviation Physiology (3)** II. Smith

Lecture—3 hours. Prerequisite: course 110. The nature and physiological consequences of the aviation environment (altitude, acceleration, motion, etc.) and of protective devices (oxygen equipment, G-suits, etc.). Field trips will be available (as course 198) to visit operational aviation physiology installations. Offered in odd-numbered years.

**148. Principles of Environmental Physiology (3)** II. Fuller

Lecture—3 hours. Prerequisite: courses 110 and 100A, or Biochemistry 101A or the equivalent. Physiological aspects of interactions of organisms and environment at cellular, system, and organismal levels. Emphasis on regulatory responses/mechanisms to thermal, pressure and osmotic environmental variables.

**\*149. Environmental Physiology of Domestic Animals (3)** III. Millam

Lecture—3 hours. Prerequisite: courses 110-110L, or Biological Sciences 1B. Influences of environmental factors on physiological processes related to animals including man. The nature of environmental variations which influence physiological responses are given emphasis.

**190. Proseminar in Physiology (3)** I, II, III. The Staff (Chairperson in charge)

Seminar—3 hours. Prerequisite: courses 110 and 100A, one additional upper division course in physiology or a related course in science, and consent of instructor. Student presentations, discussion, and critical evaluation of material in important areas of physiology. Topics may vary from year to year. Limited enrollment.

**190C. Introduction to Physiological Research (1)** I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour. Prerequisite: upper division standing in physiology or related biological science; consent of instructor. Introduction to research findings and methods in physiology. Presentation and discussion of research by faculty and students. May be repeated for credit. (P/NP grading only.)

**192. Internship (1-12)** I, II, III. The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learn experience off and on campus in all subject areas offered in physiology. (P/NP grading only.)

**196A. Voluntary Control of Physiological Processes (2)** II, III. Lorenz

Seminar—1 hour; laboratory—3 hours. Prerequisite: adequate upper division preparation in at least one of the following: physiology, behavioral science, computer science, physics or electrical engineering; consent of instructor. Individual or team projects in voluntary control of physiological processes emphasizing application of microcomputer-assisted biofeedback techniques. (P/NP grading only.)

**196B. Voluntary Control of Physiological Processes (1-4)** II, III. Lorenz

Laboratory—3-12 hours. Prerequisite: course 196A. Individual or team projects in voluntary control of physiological processes emphasizing application of microcomputer-assisted biofeedback techniques. May be repeated for credit with a maximum of 6 units for 196A-196B course sequence. (P/NP grading only.)

**198. Directed Group Study (1-5)** I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5)** I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses****200L. Advanced General Physiology Laboratory (4)** II. B. Wilson

Discussion—2 hours; laboratory—6 hours. Prerequisite: courses in undergraduate biochemistry, cell biology, or general physiology, or consent of instructor. Design, performance, and interpretation of experiments in cellular and general physiology with emphasis on somatic cells. Basics of cell culture and study of growth, differentiation, metabolism, morphology, and physiological regulation of animal cells *in vitro*.

**213. Principles of Electronics for Biologists (2)** III. Horowitz, Scobey

Lecture—1 hour; laboratory—3 hours. Prerequisite: Physics 5A, 5B, 5C, and Mathematics 16A, 16B, 16C or the equivalent. Principles of electronics applied to biological measurements. Focuses on interconnection of laboratory instruments including filters and computers. Topics covered include: RC networks; operational amplifiers; digital gates; computer interfacing; and programming.

**214. Neurophysiology (4)** II. Carstens

Lecture—4 hours. Prerequisite: courses 111B, 112; consent of instructor. Electrical activity of neurons and neuroeffector junctions; physiology of the nervous system as studied by its electrical activity.

**215. Neurophysiology Laboratory (3)** III. Horowitz, Scobey

Discussion—3 hours; laboratory—9 hours. Prerequisite: course 214 (may be taken concurrently). Selected experiments based on modern concepts to illustrate in depth, surgical techniques, stimulating and recording techniques used in neurophysiology research.

**216. Neurophysiology Literature (2)** III. Pappone

Discussion—2 hours. Prerequisite: course 214. Critical reading and group discussion of current and classic original papers in neurophysiology.

**217. The Vertebrate Eye (3)** II. Sillman

Lecture—3 hours. Prerequisite: course 112 or the equivalent. The vertebrate eye will be considered from the standpoint of its physiology, biochemistry, and biology. Retinal functions and mechanisms will be stressed, with particular emphasis on the photoreceptors. Offered in even-numbered years.

**218. Topics in Circulatory Pathophysiology (3)** II. Weidner

Lecture—1 hour; discussion—2 hours. Prerequisite: course 113 (or the equivalent) or consent of instructor. Selected topic in circulatory or cardiopulmonary physiology will be addressed each offering. Topics

will include pathophysiology. Lecture and discussion based on current research literature in the field. May be repeated with consent of instructor. Offered in odd-numbered years.

**\*219. Muscle Growth and Development** (3) II. B. Wilson, Band man (Food Science and Technology) Lecture—2 hours; seminar—1 hour. Prerequisite: Biochemistry 101B; Zoology 100, 121A; 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 odd-numbered years.

**220. General and Comparative Physiology of Reproduction** (3) I. Anderson (Animal Science), Stabenfeldt (Reproduction)

Lecture—3 hours. Prerequisite: courses 110, 110L; Biochemistry 101B; Genetics 100. 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.

**230. Advanced Endocrinology** (2) II. Moberg Lecture—2 hours. Prerequisite: course 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 different topics covered.

**231. Neuroendocrinology** (2) II. Woolley

Lecture—1 hours; discussion—1 hour. Prerequisite: course 130 or an equivalent course in endocrinology. Neuralendocrine interactions; neural regulation of endocrine system, especially in relation to reproduction; the role of hormones in sexual differentiation of the brain and in other developmental effects on the brain. May be repeated with consent of instructor when subject matter differs substantially.

**234. Neurophysiological Basis of Neurotoxicology**

(3) I. Woolley Lecture—2.5 hours; discussion—0.5 hour. Prerequisite: course 110 or the equivalent; basic understanding of neurophysiology; consent of instructor. Mechanisms of action of a number of different neurotoxins, including marine toxins, insecticides and heavy metals. Examples of ways toxins may act on the nervous system and techniques for study of neurotoxicology. (Same course as Environmental Toxicology 234.)

**242. Physiological Rhythmicity** (1) I. Winget

Lecture—1 hour. General aspects and basic mechanisms of biological rhythms; the importance of rhythm desynchronization in areas of pharmacology and space medicine; telemetry; mathematical methods; chronometry; tidal, lunar, and annual periods; periodic desynchronization. Offered in odd-numbered years.

**\*250. Development of Physiological Concepts:**

**Selected Topics** (3) I. The Staff (Chairperson in charge)

Lecture—2 hours; discussion—1 hour. Historical development of physiology. Selected topics from ancient to modern times. Course may be repeated for credit when a different topic is studied. (S/U grading only.)

**275. Neurohumoral Regulatory Mechanisms of Thermogenesis** (3) II. Horwitz, Horowitz

Lecture—2 hours; discussion—1 hour. Prerequisite: course 100A or the equivalent; Biochemistry/Physiological Sciences 101A 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) I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. (S/U grading only.)

**290C. Research Conference In Physiology** (1) I, II, III. The Staff (Chairperson in charge) 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.)

**291A. Selected Topics in Visual Science** (2) III.

Chalupa (Psychology), Johnson (Ophthalmology), Scobey (Neurology), Sillman Seminar—2 hours. Prerequisite: graduate student standing and consent of instructor; course 217 recommended. Vision from the standpoint of physiology, biochemistry, morphology and psychophysics. Consideration of all levels of the visual system from periphery to highest brain centers. Emphasis on recent research. Topics vary each year. May be repeated for credit. (S/U grading only.)

**291B. Seminar in Cellular Mechanisms of Adaptation** (1) I, II, III. Horwitz

Discussion—0.5 hour; seminar—0.5 hour. Prerequisite: course 100B; Biochemistry 101B or Physiological Sciences 101B; consent of instructor. Review and evaluation of current literature and research in cellular adaptations to the environment. May be repeated for credit when a different topic is studied. (S/U grading only.)

**291C. Selected Topics in Cellular Physiology and Biochemistry** (2) II. Sillman, Traut (Biological Chemistry)

Seminar—2 hours. Prerequisite: one course in biochemistry; course 100A or Zoology 121A or 121B. General physiology, cell biology, and molecular biology of living systems, with emphasis on cell form and function. One topic, representing a timely and important area of research, will serve as the focus throughout the course. May be repeated for credit. (Same course as Biological Chemistry 291.)

**291D. Research Approaches in Physiology** (2) I.

The Staff (Chairperson in charge) 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.)

**291E. Selected Topics in Gastrointestinal Physiology** (2) III. Mendel

Lecture—1 hour; discussion—1 hour. Prerequisite: course 114 or 120C; Biochemistry 101B or Physiological Sciences 101B. In-depth coverage of selected topics in gastrointestinal physiology. Different topic covered each time course offered. May be repeated for credit. Offered in odd-numbered years.

**297T. Tutoring in Physiology** (3) I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour; tutorial—2 hours. Prerequisite: completion of course to be tutored (with a grade of A) and consent of instructor. Advanced study of systemic physiology through leading small discussion groups in upper division courses (students are required to attend lectures in the course which they are tutoring). May be repeated for credit by tutoring in different courses or in the continuation of a course (e.g., courses 112, 113, 114). (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

### Professional Course

**300A-300B. Pedagogical Aspects of Physiology in Higher Education** (3-3) I, II, III. The Staff (Chairperson in charge)

Lecture, discussion, or laboratory, or combination. 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.)

## Physiology (A Graduate Group)

Charles A. Fuller, Ph.D., Chairperson of the Group Group Office, 196 Briggs Hall (916-752-0203)

**Faculty.** Consists of more than 70 faculty members drawn from 23 departments in the College of Agriculture and Environmental Sciences, the College of Letters and Science, the School of Medicine, and the School of Veterinary Medicine.

**Graduate Study.** The Graduate Group in Physiology offers programs of study and research leading to the M.S. and Ph.D. degrees. The programs emphasize broad training in the fundamental principles of physiology and in-depth specialization in cardiorespiratory, cellular, comparative, endocrine, reproductive, exercise, metabolic, neuro-, systemic and domestic animal physiology. For information regarding these programs, address the Program Staff Person at the above location.

**Graduate Advisers.** J.M. Horowitz (*Animal Physiology*), J.H. Jones (*Physiological Sciences*), and P.A. Mole (*Physical Education*).

**Admissions Officer.** B.A. Horwitz (*Animal Physiology*)

## Plant Biology (A Graduate Group)

Fred Bliss, Ph.D., Chairperson of the Group

Group Office, 152 Robbins Hall (916-752-7094/ FAX 916-752-4754)

**Faculty.** Includes 120 faculty members from ten departments in the field of plant biology.

**Graduate Study.** The new Plant Biology Graduate Group includes faculty who were members of the former Botany and Plant Physiology Graduate Groups as well as members of the departments of Genetics and Biochemistry and Biophysics. The program is designed to prepare students for careers in teaching and research at colleges and universities, government or industrial laboratories. The graduate curriculum involves both a broad overview of the discipline and in-depth study and research in one of four areas of specialization: Cell and Molecular Biology; Ecology, Systematics, and Evolution; Integrative Plant and Crop Physiology; and Plant Development and Structure. These areas of specialization permit individual study and research into diverse aspects of plant biology, including anatomy, biochemistry, cell biology, cytology, developmental biology, ecology, genetics, molecular biology, morphology, mycology, paleobotany, phycology, physiology, systematics, and weed science.

**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 prerequisites to the advanced degrees in Plant Biology: inorganic chemistry, organic chemistry, introductory physics, genetics, structural botany, biochemistry, introductory plant physiology, introductory plant physiology laboratory, calculus, introductory statistics, and evolutionary biology. Limited deficiencies can be made up after admission. 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.

## Plant Pathology

(College of Agricultural and Environmental Sciences)  
John M. Duniway, Ph.D., Chairperson of the Department  
Department Office, 354 Hutchison Hall (916-752-0300)

### Faculty

Richard M. Bostock, Ph.D., Associate Professor  
George Bruening, Ph.D., Professor  
Edward E. Butler, Ph.D., Professor Emeritus  
Robert N. Campbell, Ph.D., Professor  
Michael R. Davis, Ph.D., Lecturer  
James E. DeVay, Ph.D., Professor  
John M. Duniway, Ph.D., Professor  
W. Harley English, Ph.D., Professor Emeritus  
Bryce W. Falk, Ph.D., Associate Professor  
David G. Gilchrist, Ph.D., Professor  
Deborah A. Golino, Ph.D., Lecturer  
Raymond G. Grogan, Ph.D., Professor Emeritus  
W. Douglas Gubler, Ph.D., Lecturer  
William B. Hewitt, Ph.D., Professor Emeritus  
Clarence I. Kado, Ph.D., Professor  
Bruce Kirkpatrick, Ph.D., Assistant Professor  
Bert Lear, Ph.D., Professor Emeritus  
James D. MacDonald, Ph.D., Associate Professor (*Plant Pathology, Environmental Horticulture*)  
James J. Marois, Ph.D., Associate Professor  
Srecko John M. Mircetich, Ph.D., Lecturer  
George Nyland, Ph.D., Professor Emeritus  
Joseph M. Ogawa, Ph.D., Professor  
Bret M. Tyler, Ph.D., Acting Associate Professor  
Jerry K. Uyemoto, Ph.D., Lecturer  
Ariena H.C. van Bruggen, Ph.D., Assistant Professor  
Robert K. Webster, Ph.D., Professor

**Related Major Program.** See the major in Plant Science.

**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 Division section in this catalog.

**Graduate Advisers.** B.M. Tyler, J.J. Marois, A.H.C. van Bruggen, B. Kirkpatrick.

### Courses in Plant Pathology

#### Upper Division Courses

**120. Introduction to Plant Pathology** (4) I. DeVay; III. Campbell

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1C; Microbiology 2 recommended. The nature, cause, and control of plant diseases.

**125. Diagnosis and Control of Plant Diseases** (4)

III. MacDonald

Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 120. Clinical plant pathology with emphasis on diagnosis, epidemiology, and control of diseases of economic plants. Students may specialize in diseases of fruits, vegetables, field crops, or ornamentals in the laboratory exercises. Offered in odd-numbered years.

**130. Physiology of Fungi** (3) I. Gilchrist, Bostock

Lecture—3 hours. Prerequisite: Biological Sciences 1C; Biochemistry 101B and Botany 119 recommended. Discussion of the nature and interrelationships of fungal cell structure, growth, spore germination, nutrition, and metabolism with emphasis on responses of fungi to environmental changes. Selected examples of beneficial and destructive roles of fungi will also be considered. Offered in odd-numbered years.

**192. Internship** (1-12) I, II, III. The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: course 120 and consent of instructor. Work-learn experience off and on campus, supervised by a member of the faculty. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

#### Graduate Courses

**205A-205B. Diseases of Vegetable and Field Crops** (3-1) III-Extra-session summer. van Bruggen

Lecture—1 hour; laboratory—2 hours; fieldwork—8 hours (Summer Session consists of one 4-5 day field trip only). Prerequisite: course 120; Botany 119. Study of vegetable and field crops diseases with emphasis on recognition and diagnosis, epidemiology, and control. (Deferred grading only, pending completion of sequence.) Course 206A-206B may be taken concurrently.

**206A-206B. Diseases of Fruit, Nut, and Vine Crops** (3-1) III-Extra-session summer. Ogawa

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 120; Botany 119. Clinical study of fruit, nut, and vine crops diseases with emphasis on etiology, epidemiology, diagnosis, and control. (Deferred grading only, pending completion of sequence.) Course 205 may be taken concurrently.

**208. Ecology of Plant Pathogens and Epidemiology of Plant Disease** (4) II. Duniway

Lecture—3 hours; discussion—1 hour. Prerequisite: course 120 or the equivalent. Interaction between higher plants, plant pathogens, and the environment which is important in the occurrence and severity of plant disease. Emphasis is placed on the population dynamics and ecology of plant pathogens in the aerial and soil environment. Offered in odd-numbered years.

**\*209. Principles of Plant Disease Control** (3) II. Bostock

Lecture—3 hours. Prerequisite: course 120 or the equivalent. Discussion of the underlying principles and methods used for the control of plant diseases. Emphasis placed on application of epidemiological principles, biological (including host resistance), and chemical strategies to achieve disease control. Offered in even-numbered years.

**210. Physiology and Biochemistry of Host-Pathogen Interaction** (4) II. Gilchrist, Bostock

Lecture—3 hours; discussion—1 hour. Prerequisite: course 130 or the equivalent; Biochemistry 101B. Discussion of the nature of host-pathogen interactions, metabolic alterations in plant disease, biochemistry of disease resistance, toxins in plant disease. Offered in odd-numbered years.

**215X. Genetics and Molecular Biology of Plant Pathogens** (4) II. Tyler

Lecture—3 hours; laboratory/discussion—3 hours. Prerequisite: course 120 and Genetics 100. Genetic analysis of pathogenicity, cultivar-specificity, and host-specificity in plant pathogens, particularly fungi; application of molecular biology to the isolation and characterization of the genes involved; and to aspects of pathogen identification; emphasis on research techniques and problem-solving. Offered in even-numbered years.

**217. Molecular Genetics of Fungi** (3) II. Holland, Tyler

Lecture—3 hours. Prerequisite: graduate standing in a biological science; Biochemistry 101B; Genetics 100, 102A; Botany 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 odd-numbered years.

**224. Pathogenic Fungi** (5) III. The Staff

Lecture—3 hours; laboratory—6 hours. Prerequisite: Botany 119. Morphology and taxonomy of plant pathogenic fungi.

**226. Plant Virology** (5) II. Bruening, Falk

Lecture—2 hours; laboratory—9 hours. Prerequisite: consent of instructor. Viruses as causal agents of plant diseases; chemical and physical properties of viruses; methods of transmission; procedures for assay and diagnosis; multiplication of viruses; patho-

logical cytology and anatomy; application of equipment and techniques used in research.

**228. Plant Bacteriology** (5) I. Kado

Lecture—2 hours; laboratory—9 hours. Prerequisite: course 120; Microbiology 2 or the equivalent; Biochemistry 101A, 101B. 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.

**290. Seminar** (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Review and evaluation of current research in plant pathology. (S/U grading only.)

**290C. Advanced Research Conference** (1) I, II, III. The Staff

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.)

**291. Seminar in Host-Parasite Physiology** (1) I, II. The Staff (Chairperson in charge)

Seminar—1 hour. Prerequisite: course 120. Review and evaluation of current literature and research in host-parasite physiology. (S/U grading only.)

**292. Seminar in Plant Virology** (1) III. The Staff (Chairperson in charge)

Seminar—1 hour. Prerequisite: course 226. Review and evaluation of current literature and research in virology. (S/U grading only.)

**295. Seminar in Mycology** (1) I. Butler; III. Wells

Seminar—1 hour. Review and evaluation of current literature and research in mycology. (S/U grading only.) (Same course as Botany 295.)

**298. Special Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

## Plant Physiology

See Botany for undergraduate majors, and Plant Biology (A Graduate Group) for graduate study.

## Plant Physiology (A Graduate Group)

Students admitted into the Plant Physiology Graduate Group before June 30, 1989 will be allowed to complete their degree in this subject.

New students, however, should see the Plant Biology Graduate Group section in this catalog.

**Information.** 152 Robbins Hall (916-752-7094)

### Courses in Plant Physiology

#### Graduate Courses

**201. Plant Senescence: Cellular and Molecular Aspects** (4) II. Romani in charge

Lecture—4 hours. Prerequisite: Botany 111, 112; Biochemistry 101A-101B. Cellular and molecular phenomena associated with the senescence of plants and plant parts. Emphasis on principles and mechanisms. Offered in odd-numbered years.

**208. Plant Hormones and Regulators** (3) II. Labavitch (Pomology), Yang (Vegetable Crops)

Lecture—3 hours. Prerequisite: Botany 112. Chemistry, biochemistry and physiological activity of major

classes of natural plant growth regulators. Primary consideration given to concepts that are of current research interest. Uses of growth regulators in agriculture. Offered in odd-numbered years.

**214. Higher Plant Cell Walls** (3) I. Labavitch (Pomology), Nevins (Vegetable Crops)  
Lecture—2 hours; discussion—1 hour. Prerequisite: Botany 112, 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 even-numbered years.

**217. Membrane Biology of Plants** (3) III. Bennett (Vegetable Crops)  
Lecture—2 hours; discussion—1 hour. Prerequisite: Botany 112 and Biochemistry 101B, or consent of instructor. Structure, biogenesis, and function of plant cell membranes. Emphasis will be placed on the molecular basis of plant membrane functions and on the role of membranes in selected physiological processes. Offered in even-numbered years.

**230. Plant Growth Kinematics** (3) I. Silk (Land, Air and Water Resources)  
Lecture—2 hours; laboratory—3 hours. Prerequisite: introductory botany, calculus, and analytic geometry. Topics include growth curves, developmental indices, growth of the plant axis, leaf expansion, phyllotaxis, growth of the apex, and environmental indices.

**290. Faculty Seminar** (1) I. The Staff Seminar—2 hours. Seminars presented by members of Plant Physiology faculty, describing their areas of research. (S/U grading only.)

**297. Tutoring in Plant Physiology** (1–5) I, II, III.  
The Staff  
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) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing.

**299. Research** (1–12) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: graduate standing. (S/U grading only.)

Discussion—1 hour; fieldwork—9 hours. Prerequisite: Entomology 110, Plant Pathology 120, Botany 120, Nematology 100 (may be taken concurrently). Problems and assessment of losses caused by insects, pathogens, weeds, nematodes, and other pests. Methods of determining infestation levels and establishing economic thresholds, and control of these pests with emphasis on integration of available management practices into programs.

**290. Seminar** (1–2) I, II, III. The Staff (Chairperson in charge)  
(S/U grading only.)

**298. Group Study** (1–5) I, II, III. The Staff (Chairperson in charge)

**299. Research** (1–12) I, II, III, summer. The Staff (Chairperson in charge)  
(S/U grading only.)

Physics (Physics 1A-1B) ..... 6  
General chemistry (Chemistry 1A-1B) ..... 10  
Organic chemistry (Chemistry 8A-8B) ..... 6  
Biological sciences (Biological Sciences 1A, 1B, 1C) ..... 15  
Plant science (Plant Science 2) ..... 5  
Mathematics (Mathematics 16A-16B) ..... 6

#### Depth Subject Matter ..... 36-37

Statistics (Agricultural Science and Management 150) ..... 4  
Soil science (Soil Science 100) ..... 4  
Weed science (Botany 120) ..... 3  
Entomology (Entomology 110 or 115) ..... 4  
Plant pathology (Plant Pathology 120) ..... 4  
Plant physiology (Botany 111, 112) ..... 6  
Genetics (Genetics 100) ..... 4  
Water science (Water Science 104 or 110) ..... 3-4  
Plant nutrition (Botany/Plant Science 135 or Soil Science 109) ..... 4

#### Select one of the following eight options ..... 38-49

##### Agronomy Option

Specific course requirements ..... 20-21  
Agronomy 100, 100L ..... 5  
Agronomy 111, 112, 113 (any two courses) ..... 7-8  
Plant Science 101 ..... 4  
Soil Science 109 ..... 4

Additional courses to be selected with consent of the adviser from the following ..... 24-25  
Agricultural Economics 130, 140, 150; Agricultural Engineering Technology 103, 104AT, 105; Agricultural Practices 49, 149; Animal Science 2, 114, 116; Atmospheric Science 105; Nematology 100, 110; Plant Pathology 125; Plant Science 102, 103, 113; Soil Science 102, 120, 150; Water Science 103, 110, 172.

Courses offered in other production departments (e.g., Vegetable Crops, Pomology, Viticulture and Enology, etc.) or in Range Science may be selected in consultation with adviser to satisfy specific individual goals.

Natural sciences electives, not to exceed 8 units, may also be included.

##### Floriculture/Nursery Management Option

Specific course requirements ..... 27  
Environmental Horticulture 6, 105, 120, 125, 133 ..... 19  
Plant Science 102, 109 ..... 8

Additional courses to be selected with consent of the adviser from the following ..... 17  
Agricultural Economics 18, 112, 113; Agricultural Engineering Technology 114; Agronomy 100; Botany 105, 111L; Economics 11A, 11B; Environmental Horticulture 107, 130; Geography 3; Landscape Architecture 40, 131, 155; Microbiology 3; Plant Pathology 125; Plant Science 101, 112, 112L, 113; Pomology 102; Psychology 144; Soil Science 109; Vegetable Crops 101; Viticulture and Enology 101B, 110, 116.

Courses offered in the natural sciences may be selected in consultation with adviser.

##### Landscape Horticulture Option

Specific course requirements ..... 30  
Environmental Horticulture 6, 105, 120, 130, 133 ..... 17  
Landscape Architecture 40, 131, 155 ..... 9  
Plant Science 102 ..... 4

Additional courses to be selected with consent of the adviser from the following ..... 15  
Agricultural Economics 18, 112, Agronomy 100; Botany 105; Economics 11A, 11B; Environmental Horticulture 107,

## Plant Protection and Pest Management (A Graduate Group)

Bruce Jaffee, Ph.D., Chairperson of the Group  
Group Office, 367 Briggs Hall (916-752-0475)

**Graduate Study.** The Graduate Group in Plant Protection and Pest Management offers programs of study and research leading to the M.S. degree. Detailed information can be obtained from the Group Chairperson and the *Graduate Announcement*.

**Graduate Adviser.** A.A. Grigarick (Entomology).

### Courses in Plant Protection and Pest Management

#### Graduate Courses

**201. Concepts and Systems of Plant Protection and Pest Management** (4) II. Marois (Plant Pathology)  
Lecture—2 hours; discussion—1 hour; laboratory—2 hours; field experiment and data analysis. Prerequisite: Entomology 110, Plant Pathology 120, Botany 120 (may be taken concurrently), Nematology 100; Botany 117 or Zoology 125 recommended. Ecological perspectives of agricultural systems, the role of pests and pest management in these systems, and the monitoring and modeling of the systems.

**202A-202B. Diagnosis of Plant Pest Problems and the Control of Causal Agents** (4-4) I. Norris (Botany); III. Wilson (Entomology)

## Plant Science

(College of Agricultural and Environmental Sciences)

#### Faculty

For faculty in departments offering areas of specialization (Depth Subject Matter) in Plant Science, see under Departments of Agronomy and Range Science; Botany; Environmental Horticulture; Land, Air and Water Resources; Plant Pathology; Pomology; Vegetable Crops; and Viticulture and Enology.

#### The Major Program

The objective of the Plant Science major is to train students in the biological and natural sciences as applicable to the technology required for the production, protection, and maintenance of crop plants, and their quality following harvest.

The Plant Science student may choose to specialize in one of the seven departmentally associated options or may choose general education by electing the general Plant Science option. The option selected will be identified immediately following the name of the major, Plant Science, on the transcript.

The Master Adviser serves as adviser for all students who opt for the Plant Science major. Following commitment to one option, the student is assigned to an adviser associated with the department offering expertise in that area.

Upon graduation, students may qualify for a career in their area of specialization or for advanced study leading to the M.S. or Ph.D. degrees. Each of the departments of Agronomy, Plant Pathology, and Vegetable Crops offer an M.S. degree in their respective fields, while the M.S. degree in Horticulture is available through the departments of Environmental Horticulture, Pomology, and Viticulture and Enology.

Occupational opportunities exist in nursery and green house management, farming, technical and sales positions in agricultural business and associated enterprises, such as banking and equipment and supply companies, as well as in private, state and federal service in consulting and research.

#### B.S. Major Requirements:

(For convenience in program planning the usual courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses may be taken with your adviser's approval. Courses shown without parentheses are required.)

UNITS  
**Written/Oral Expression** ..... 8-11  
See College requirement ..... 7

Additional English (English 102 in plant science or related area, or English 104) ..... 1-3

**Preparatory Subject Matter** ..... 59-61

Computer science (Agricultural Science and Management 21) ..... 3  
Economics (Economics 1A or 1B) ..... 5

125; Geography 3; Landscape Architecture 111; Plant Pathology 125; Plant Science 101, 109, 113; Pomology 101; Soil Science 109; Vegetable Crops 101; Wildlife and Fisheries Biology 10. Courses offered in the natural sciences may be selected in consultation with adviser.

#### Plant Pathology Option

Specific course requirements .....	40
Biochemistry 101A, 101B .....	6
Botany 105, 119 .....	10
Chemistry 1C, 5 .....	9
Microbiology 2, 3 .....	4
Nematology 100 .....	4
Plant Pathology 125, 130 .....	7

#### Plant Science Option

Specific course requirements .....	46-49
Plant science (Plant Science 101, 102, 109, 113, 122) .....	11
Agricultural economics (Agricultural Economics 18, 113, 120, 130, 140, 150) .....	3-5
Agronomy (Agronomy 100, 100L) .....	5
Environmental horticulture (Environmental Horticulture 6, 105, 125, 130) .....	3-4
Pomology (Pomology 101, 102) .....	4
Vegetable crops (Vegetable Crops 101) .....	4
Viticulture (Viticulture 2) .....	2
Biochemistry (Biochemistry 101A, 101B) .....	6
Environmental toxicology (Environmental Toxicology 101) .....	4
Soils (Soil Science 109) .....	4

#### Pomology Option

Specific course requirements .....	15
Pomology 101, 102 .....	8
Plant Science 109, 112 .....	7
Additional courses to be selected with consent of the adviser from the following .....	30
Agricultural Economics 112, 140; Agricultural Engineering Technology 101AT; Agronomy 100, 100L; Atmospheric Science 105; Entomology 119, 119L; International Agricultural Development 101; Nematology 100, 110; Plant Pathology 125, 130; Plant Science 101, 102, 112, 112L, 113; Pomology 103; Soil Science 102, 109, 120, 150; Vegetable Crops 101, 118; Viticulture and Enology 110, 116; Water Science 110.	

Natural sciences electives, not to exceed 8 units, may also be included.

#### Vegetable Crops Option

Specific course requirements .....	19
Vegetable Crops 101, 105, 150 .....	12
Plant Science 102, 112 .....	7
Additional units selected with consent of adviser from the following .....	19
Agricultural Economics 130; Biochemistry 101A, 101B, 122; International Agricultural Development 110A, 110B, 141; Plant Pathology 125; Plant Science 101, 103, 112L, 113, 122, 126, 135, 196, 270; Soil Science 109; Vegetable Crops 118, 195; one unit of seminar to be selected with consent of adviser in subject matter area of specialization; 2 units of 190 or 198 or 9 units of 199 may be applied toward requirement. A Senior Thesis option is available.	

Natural sciences electives, not to exceed 8 units, may also be included.

#### Viticulture Option

Specific course requirements .....	34-35
Biochemistry 101A, 101B .....	6
Plant Science 101, 102, 109 .....	12
Viticulture and Enology 2, 101A, 101B, .....	

101C, 110 or 111, 115 or 116, 118 .....

16-17  
Additional courses to be selected with consent of the adviser from the following .....

10-11

Agricultural Economics 18, 140, 150; Agricultural Engineering Technology 101AT; Agricultural Practices 49, 149; Atmospheric Sciences 105; Biochemistry 122; Nematology 100, 110; Plant Pathology 125; Plant Physiology 208; Plant Science 103, 112, 112L, 113, 122, 202; Soil Science 102, 109, 150; Viticulture and Enology 110, 111, 210, 216, 217, 219; Water Science 103, 110, 172.

Natural sciences electives, not to exceed 8 units, may also be included.

#### Unrestricted Electives .....

0-30  
Prerequisite: course 10; introductory genetics (e.g., Genetics 100). Diversity and domestication of economic plants; principles of plant evolution; centers of origin, genetic diversity and germ plasm collections; implications in new agricultural developments. Offered in even-numbered years.

#### \*107L. Plant Cell, Tissue, and Organ Culture (5) III. The Staff (Pomology)

Lecture—2 hours and laboratory—6 hours (intensive 5-day session); seminar—1 hour and research projects. Prerequisite: Botany 111, 112 (may be taken concurrently); consent of instructors. Basic and applied aspects of plant tissue culture methodology with emphasis on quantification. Intensive one-week methodology section will be conducted before spring quarter, but can extend into the first week of instruction. Application of methodology will extend throughout the quarter with weekly seminars and individual research projects.

#### 109. Plant Propagation (4) II. Sutter (Pomology)

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 2 or Biological Sciences 1C. Principles and practices of propagating plants covering anatomical, physiological, and practical aspects.

#### 112. Postharvest Physiology and Handling of Horticultural Commodities (3) I. Kader (Pomology), Reid (Environmental Horticulture), Saltveit (Vegetable Crops)

Lecture—3 hours. Prerequisite: general plant science background recommended (e.g., course 2, 10 or Food Science and Technology 2); concurrent enrollment in course 112L recommended. Physiological processes related to the maturation and senescence of fruits, vegetables, and ornamentals; fundamentals involved in handling, transportation, storage, and marketing practices, e.g., temperature and humidity control, protective treatments, controlled atmospheres.

#### 112L. Postharvest Physiology and Handling Laboratory (2) I. Reid (Environmental Horticulture), Saltveit (Vegetable Crops)

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 112 (may be taken concurrently). Demonstrations and exercises following the subject matter of course 112. One or more field trips to observe commercial practices.

#### 113. Plant Breeding (4) II. St. Clair (Vegetable Crops)

Lecture—3 hours; demonstration-discussion—2-3 hours. Prerequisite: Genetics 100 (may be taken concurrently). The principles of plant breeding applied to economic crops.

#### 122. Physiological Genetics of Crop Plants (3) I. Jones (Vegetable Crops)

Lecture—3 hours. Prerequisite: Genetics 100; Botany 111, 112; or consent of instructor. Principles and recent advances in the physiological genetics of plants. Plant developmental processes related to yield will be considered at several levels; genetic control, biochemical regulation and the impact of the environment on development of plants. Offered in odd-numbered years.

#### 126. Physiology of Environmental Stresses in Plants (3) II. Läuchli (Land, Air and Water Resources)

Lecture—2 hours; discussion—1 hour. Prerequisite: Botany 112 (may be taken concurrently) or the equivalent. Principles and selected topics in physiology of environmental stresses in plants. Areas emphasized are general stress concepts, physiological responses of plants to selected environmental stresses and integration of stresses.

#### 135. Mineral Nutrition of Plants (4) III. The Staff (Land, Air, and Water Resources)

Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 111 or the equivalent. Evolution and scope of plant nutrition; essential and other elements; mechanisms of absorption and translocation; mineral metabolism; deficiencies and toxicities; genetic and ecological aspects of plant nutrition. (Same course as Botany 135.)

**140. Principles of Plant Biotechnology** (3) II. Dandekar (Pomology)  
Lecture—3 hours. Prerequisite: Biological Sciences 1A and Genetics 100. Principles and concepts of plant biotechnology including recombinant DNA technology, plant molecular biology, plant cell and tissue culture, and crop improvement.

**192. Internship** (1-12) I, II, III, summer. The Staff (Rains in charge)  
Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learn experience off or on campus in all subject areas pertaining to Plant Science. Internships supervised by a member of the faculty. (P/NP grading only.)

**196. Postharvest Technology of Horticultural Crops** (3) III. Kader (Pomology) in charge  
Lecture-discussion-demonstration—5 days; field trip—5 days. Prerequisite: upper division or graduate student standing. Intensive study of current procedures for postharvest handling of fruits, nuts, vegetables, and ornamentals in California. Scheduled first two weeks immediately following last day of spring quarter. Considered a spring course for preenrollment. (P/NP grading only.)

**197. Tutoring in Plant Science** (1-4) I, II, III. The Staff (Rains (Agronomy and Range Science) in charge)  
Prerequisite: upper division standing; completion of course being tutored or the equivalent. Leading discussion sections, conducting laboratory exercises or proctoring in personalized-system-of-instruction-format classes under faculty guidance. May be repeated once for credit if different course is tutored. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Rains in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

#### Graduate Courses

**202. Advanced Physiology of Cultivated Plants** (2) I. Sachs (Environmental Horticulture), Labavitch (Pomology)  
Lecture—1 hour; discussion—1 hour. Prerequisite: courses 101 and 102; Botany 111, 112. Selected physiological topics generally focusing on source-sink behavior affecting crop production and quality. (P/NP grading only.) Offered in even-numbered years.

**216. Advanced Topics in Mineral Nutrition** (4) III. Läuchli (Land, Air and Water Resources)  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 135 or consent of instructor. Cellular compartmentation of mineral elements, new methods and results; selected topics in absorption, translocation, metabolism and function of mineral elements; nutrition and transport in plants adapted to special nutrient environments. Offered in odd-numbered years.

**221A-221B. Applied Crop Physiology** (4-4) III. Shennan (Vegetable Crops)  
Lecture—1 hour; seminar—1 hour; laboratory—6 hours. Prerequisite: courses 101 and 102 or Botany 111, 112 or consent of instructor. Research methods in applied plant physiology with examples drawn primarily from agronomic and vegetable crops. Field and laboratory projects, data reduction, and preparation of suitable reports.

**270. Reproductive Biology of Flowering Plants** (3) I. Wu (Environmental Horticulture)  
Lecture—2 hours; discussion—1 hour. Prerequisite: Botany 111 and Genetics 100. Fundamental mechanisms of reproductive biology of flowering plants and their impact on genetic variation, evaluation, and cultural practices. Offered in odd-numbered years.

**291. Seminar in Postharvest Biology** (1) I, II, III. (Faculty of the Interdepartmental Postharvest Biology Group)  
Discussion—1 hour. Prerequisite: consent of the instructor; open to advanced undergraduates. Intensive study of selected topics in the postharvest biology of fruits, vegetables and ornamentals. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff  
To be arranged.

## Plastic Surgery

### See Medicine, School of

## Political Science

(College of Letters and Science)

Larry Berman, Ph.D., Chairperson of the Department  
Department Office, 227 Voorhies Hall (916-752-0966)

#### Faculty

Donna L. Bahry, Ph.D., Professor  
Larry Berman, Ph.D., Professor  
Edmond Costantini, Ph.D., Professor  
Philip L. Dubois, Ph.D., Professor  
Richard W. Gable, Ph.D., Professor  
John B. Gates, Ph.D., Assistant Professor  
Emily O. Goldman, Ph.D., Assistant Professor  
Alexander J. Groth, Ph.D., Professor  
Charles M. Hardin, Ph.D., Professor Emeritus  
Stuart L. Hill, Ph.D., Associate Professor  
Mary Jackman, Ph.D., Professor (*Political Science, Sociology*)  
Robert Jackman, Ph.D., Professor  
Clyde E. Jacobs, Ph.D., Professor Emeritus  
Bruce W. Jentleson, Ph.D., Associate Professor  
Joyce K. Kallgren, Ph.D., Professor  
Lloyd D. Musolf, Ph.D., Professor Emeritus  
Miroslav Nincic, Ph.D. Professor  
John R. Owens, Ph.D., Professor Emeritus  
Larry I. Peterman, Ph.D., Professor  
Donald S. Rothchild, Ph.D., Professor  
Richard Sinopoli, Ph.D., Assistant Professor  
Randolph M. Siverson, Ph.D., Professor  
Andrew Skalaban, Ph.D., Assistant Professor  
Alvin D. Sokolow, Ph.D., Professor  
Larry L. Wade, Ph.D., Professor  
Geoffrey A. Wandesforde-Smith, Ph.D., Associate Professor (*Political Science, Environmental Studies*)  
Young-Kwan Yoon, Ph.D., Assistant Professor  
Marvin Zetterbaum, Ph.D., Professor  
Paul E. Zinner, Ph.D., Professor

#### The Major Programs

Political Science is the study of politics and political systems at the subnational, 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 Department of Political Science offers two major programs: Political Science and Political Science—Public Service. Both provide students with preparation for subsequent careers as well as with a better understanding of politics in general and of the political systems in which they live.

The major in Political Science aims to provide a broad understanding of political concepts and values, political institutions, political behavior and political processes. It offers excellent preparation and background for later careers in government, politics, law, journalism, business, urban planning, administration and teaching.

The Political Science—Public Service major is designed for students who have a specific interest in a career or other activities in or around government. This undergraduate program can also serve as preparation for enrollment in graduate and professional schools. The major combines regular course

work in political science and related fields with two quarters of public affairs internship for which academic credit is granted. It differs from the regular Political Science major in having the internship as a requirement and in emphasizing upper division course work in functional and substantive policy areas of American Government. The functional areas are policy formulation, implementation, and interpretation and the substantive policy areas include urban, environmental, or others designed by the student and faculty counselors. Courses taken in other departments, for example, Economics, Environmental Studies, Environmental Biology and Management, may also be used to satisfy the major.

#### Political Science

#### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>19-20</b>
Three courses from Political Science 1, 2, 3, 4, 5, 7 .....	11-12 (Course 7 may not be taken if course 5 is taken.)
Two courses from History 3, 4A, 4B, 4C, 10, 11A, 11B, 11C, 12A, 12B, 12C, 13A, 13B, 13C, 133, 134A, 134B, 145, 146A, 146B, 147A, 147B, 147C, 151A, 151B, 151C, 151D .....	8
<b>Depth Subject Matter</b> .....	<b>36</b>
Select two courses in each of three fields, listed below. The fields must be chosen from at least two Groups, A, B, or C.....	24
Group A	
(1) Political theory: Political Science 111-119	
Group B	
(2) American government: Political Science 100-109, 171, 173-175, 191, 195	
(3) Parties and political behavior: Political Science 160-170	
(4) Public law: Political Science 150-156	
(5) Public administration: Political Science 180-189	
Group C	
(6) Comparative government: Political Science 140, 141, 145-148B, 177-179	
(7) International relations: Political Science 120-139	

Additional upper division units in political science to achieve a total of 36 .....12  
Only 5 units of Political Science 192 (internship) may be counted towards the 36-unit requirement; and Political Science 192A or 192B may not be counted toward a field requirement.

**Total Units for the Major** .....**55-56**

#### Political Science—Public Service

#### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>11-12</b>
One course from Political Science 1, 5, or 7 .....	3-4
Two courses from Political Science 2, 3, or 4 .....	8
Recommended: Economics 1A-1B.	
<b>Depth Subject Matter</b> .....	<b>48</b>
Core program .....	12
Two courses chosen from Political Science 100, 104, 105, 106, 113, 180, 181; and one course from Political Science 108, 109, 114.	
Internship, Political Science 192A, 192B .....	10
Research paper, Political Science 193 .....	2

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.)	
<b>Total Units for the Major .....</b>	<b>59-60</b>

#### Fields of Concentration

- (1) **Policy formulation:** Political Science 103, 105, 106, 108, 109, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 173, 174, 175, 195; Economics 130.
- (2) **Policy implementation and evaluation:** Political Science 156, 180, 181, 182, 183, 187, 188, 189; Economics 131
- (3) **Policy interpretation—Substance and procedures (public/pre-law):** Political Science 151, 152, 153, 155, 156.
- (4) **Policy areas:**
  - a) Urban policy and implementation: Political Science 100, 101, 102, 191, Economics 125, Environmental Biology and Management 110, Environmental Studies 173.
  - b) Environmental policy and implementation: Political Science 107, Economics 123, Environmental Studies 160, 161, 166, 168A-168B, 179.
  - c) —— policy and implementation: open field that might include courses relevant to health care, welfare, education, community development, transportation, science and technology, etc. (requires approval of Public Service adviser).

**Major Advisers.** Consult Departmental Office.

#### Minor Program Requirements:

Students electing a minor in Political Science may choose one of two plans:

#### UNITS

<b>Political Science .....</b>	<b>24</b>
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**Plan I:** Upper division units in political science (may include 4 units of lower division course work) distributed among at least two of the three Groups, A, B, and C, designated in the general Political Science major .....

24

**Plan II:** Upper division units in political science, with the approval of the minor adviser.....

24

This plan does not require a distribution of courses in any particular group inasmuch as the courses chosen will be those most appropriate to the student's academic major.

**Teacher Credential Subject Representative.** Consult Departmental Office. See also the section on the Teacher Education Program.

**Graduate Study.** The Department offers programs of graduate study and research leading to the M.A. and Ph.D. degrees. Information concerning admission to these programs and requirements for completion are available in the department office.

**Graduate Adviser.** Consult Departmental Office.

**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 Intern Coordinator, Political Science Department, 226 Voorhies Hall, 752-1989.

**American History and Institutions.** This University requirement may be satisfied by passing any one of the following Political Science courses: 1, 5, 100, 101, 102, 103, 104, 105, 106, 108, 109, 113, 130, 131, 160, 163. (See also under University requirements.)

## Courses in Political Science

#### Lower Division Courses

##### 1. American National Government (4) I. Hill; II.

Costantini; III. Berman

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. General Education credit: Contemporary Societies/Introductory. (CAN Govt 2)

##### 2. Introduction to Comparative Politics (4) I. Groth

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. General Education credit: Contemporary Societies/Introductory.

##### 3. International Relations (4) I. Nincic; II. Goldman; III. Siverson

Lecture—3 hours; discussion—1 hour. International conflict and cooperation, including the Cold War, nuclear weapons, and new techniques for understanding international politics.

##### 4. Basic Concepts in Political Theory (4) II. Zetterbaum

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. General Education credit: Civilization and Culture/Introductory.

##### 5. Contemporary Problems of the American Political System (4) III. Skalaban

Lecture—3 hours; discussion—1 hour. In-depth treatment of selected problems and issues of American politics, governmental institutions, and policies.

##### 7. Contemporary Issues in Law and Politics (4) I. Gates

Seminar—4 hours. A freshmen-sophomore seminar which focuses 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. Limited enrollment.

##### 99. Special Study for Undergraduates (1-5) I, II, III.

The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

#### Upper Division Courses

##### 100. Local Government and Politics (4) I. Sokolow

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or consent of instructor. 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.

##### 101. Urban Political Economy (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100 or consent of instructor. Historical development of urban political economies. Focuses on ways in which different groups have tried to use local government authority to achieve their objectives and why they succeeded or failed.

##### 102. Urban Public Policy (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or 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.

##### 103. American Federalism (4) III. Sokolow

Lecture—3 hours; research paper. Prerequisite: course 1 or 5 recommended. American politics and policy in the context of national-state-local relations. Constitutional roots of Federalism, centralizing and

decentralizing tendencies, fiscal relations, current policy issues, and management of intergovernmental programs.

##### 104. California State Government and Politics (4) II. Sokolow

Lecture—3 hours; research paper. The California political system. Political culture, constitution, elections and parties, direct democracy, legislature, governor, executive branch, courts, finances, state-local relations, and policy issues.

##### \*105. The Legislative Process (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Analysis of 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.

##### 106. The Presidency (4) II. Berman or staff

Lecture—3 hours; discussion—1 hour; optional term paper. The American presidency's 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.

##### 107. Environmental Politics and Administration (4) I. Wandesforde-Smith

Lecture—3 hours; discussion—1 hour. 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.

##### \*108. Policy Making in the Public Sector (4) I. The Staff

Lecture—3 hours; research paper. The 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.

##### 109. Public Policy and the Governmental Process (4) III. Wade

Lecture—3 hours; research paper. 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.

##### \*111. Systematic Political Science (4) II. The Staff

Lecture-discussion—4 hours. Philosophical basis of modern political science; major specific approaches; selected concepts relevant to modern political concerns; and research design and execution.

##### 112. Contemporary Democratic Theory (4) I. Wade

Lecture—3 hours; discussion—1 hour. Major contemporary attempts to reformulate traditional democratic theory; attempts to replace traditional theory by conceptual models derived from modern social science findings. Offered in odd-numbered years.

##### 113. American Political Thought (4) I. Sinopoli

Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Origins and nature of American political thought. Principles of American thought as they emerge from the founding period to the present.

##### 114. Quantitative Analysis of Political Data (4) I. Skalaban

Lecture—3 hours; term paper. 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 in odd-numbered years.

##### \*115. Medieval Political Thought (4) II. Peterman

Lecture—3 hours; term paper. Prerequisite: course 118A. 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.

**116. Foundations of Political Thought: A Study in Depth of a Major Political Philosopher (4) II.**

Peterman

Lecture-discussion—3 hours; term paper. Intensive analysis and evaluation of the seminal works of a major political philosopher.

**117. Marxism (4) II. Zetterbaum**

Lecture—3 hours; discussion—1 hour. Examination of the political and social philosophy of Karl Marx, with reference to the evolution of Marxism in the nineteenth and twentieth centuries.

**118A. History of Political Theory (4) I. Peterman**

Lecture—3 hours; term paper. Critical analyses of the works of major political philosophers. Classical and medieval political philosophy—Plato, Aristotle, Cicero, St. Thomas.

**118B. History of Political Theory (4) II. Peterman**

Lecture—3 hours; special assignments. Critical analyses of the works of major political philosophers. Modern political philosophy—Machiavelli, Hobbes, Locke, Rousseau, Burke.

**118C. History of Political Theory (4) III. Sinopoli**

Lecture—3 hours; term paper. Critical analyses of the works of major political philosophers. Nineteenth and twentieth centuries: Hegel, Tocqueville, Mill, Marx, Nietzsche, Sartre.

**119. Modern Political Thought (4) I. Sinopoli**

Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Study in depth of philosophers considered central to modern political thought, especially nineteenth and twentieth century political thought. Emphasis will be upon an individual philosopher or concept rather than upon a survey of modern political thought.

**120. Theories of International Politics (4) I. Siverson**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing or 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.

**121. War (4) II. Siverson**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 3 recommended. An analysis of political processes involved in the initiation, conduct, and termination of modern international warfare.

**\*122. International Law (4) II. The Staff**

Lecture—4 hours. Selected topics in international law; territory, sovereign immunity, responsibility, the peaceful settlement or nonsettlement of international disputes.

**123. The Politics of Interdependence (4) I, II. Yoon and staff**

Lecture—3 hours; term paper. Prerequisite: upper division standing or 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.

**124. The Politics of Global Inequality (4) III. Yoon**

Lecture—3 hours; term paper. Prerequisite: upper division standing; course 123 recommended. Long-standing division of the global system into richer and poorer regions poses many important problems in international political economy. Course presents a theoretical background to North-South issues and analyses of current problems in economic and political relations.

**126. Ethnic Self-Determination and International Conflict (4) III. Rothchild**

Lecture—3 hours; individual meetings with students to discuss term papers. Prerequisite: one international relations course 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.

**\*127. Nationalism and Imperialism (4) II. Kallgren**

Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. Theory of nation building illustrated by Western and non-Western experience. Offered in even-numbered years.

**128. International Communism (4) III. Zinner**

Lecture—4 hours. Prerequisite: upper division standing; course 2 or 3, or consent of instructor. International communist movement; ideology organization, strategy. Relations among communist parties; problems of leadership and social composition; the Sino-Soviet conflict and its effects on revolutionary struggle. Offered in even-numbered years.

**129. Special Studies in International Politics (4) III. The Staff**

Lecture—3 hours; term paper. Prerequisite: upper division standing. Intensive examination of one or more special problems in international politics. May be repeated once for credit when different topic is studied.

**130. Recent U.S. Foreign Policy (4) II, III. Nincic and staff**

Lecture—3 hours; term paper. Prerequisite: upper division standing or 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.

**131. Analysis of U.S. Foreign Policy (4) II. Goldman**

Lecture—3 hours; term paper. Prerequisite: upper division standing or 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.

**132. National Security Policy (4) III. The Staff**

Lecture—3 hours; term paper. Prerequisite: upper division standing. 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.

**\*133. The American Role in East Asia (4) I. Kallgren**

Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. Survey of the role the United States has played in East Asia. Influence on Asian westernization of U.S. governmental East Asian policy, missionaries, traders, and returning students. Offered in even-numbered years.

**134. Africa and U.S. Foreign Policy (4) I. Rothchild**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or 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 nonalignment, producer cartels, multinational corporations, continental integration, and trade and aid relations.

**136. Soviet Foreign Policy (4) I, III. Zinner, Bahry**

Lecture—4 hours. Prerequisite: upper division standing or consent of instructor. Conduct of Soviet foreign relations in contemporary world affairs; ideology and power as mainsprings of policy; foreign policy as an instrument of revolution; the role of diplomacy, economic aid and nuclear armaments.

**137. International Relations in Western Europe (4) II. Zinner**

Lecture—4 hours. Prerequisite: upper division standing. 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.

**138. International Relations: East Asia (4) I. Kallgren**

Lecture—4 hours. Prerequisite: upper division standing; course 3 recommended. Analysis of international relations and diplomacy in East Asia. Emphasis upon twentieth century problems with examples from China, Japan, Korea, and Southeast Asia.

**\*139. Special Studies in Foreign Policy (4) I, II, III. The Staff**

Lecture—3 hours; term paper. Prerequisite: upper division standing or consent of instructor. Extensive examination of one or more special problems in foreign policy. May be repeated once for credit when different topic is studied.

**140. Comparative Public Policy (4) II. Groth**

Lecture—3 hours; term paper. Ideological orientations, institutions, processes, and public policies of modern states. Emphasis on democratic, socialist, communist and fascist experience.

**141. Communist Political Systems (4) I, III. Bahry, Zinner**

Lecture—4 hours. Prerequisite: course 2 or consent of instructor. Systematic comparative analysis of the origin, structure and performance of communist political systems with emphasis on the Soviet Union and the states of Eastern Europe.

**142. Politics and Inequality (4) II. Jackman**

Lecture—3 hours; term paper or discussion—1 hour. Examines the linkages between politics and the distribution of social and economic goods. Topics include the impact of civil rights legislation, the politics of welfare states, and the effects of political participation on the distribution of goods.

**\*145. Government and Politics in Emergent Nations (4) III. Zinner**

Lecture—4 hours. Prerequisite: course 2. Conceptual study of problems of political organization and procedure in the context of rapid change engendered by social revolution in "emergent countries" and liberation from colonial oppression. Offered in even-numbered years.

**\*146. Contemporary African Politics (4) I. Rothchild**

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Analysis of party systems, military coups, bureaucracy, regional integration, and disintegration, and economic development in Africa south of the Sahara.

**\*147. Politics and Policy in Western Europe (4) II. The Staff**

Lecture—4 hours. The evolution, politics, and contemporary problems of selected political systems of Western Europe.

**148A. Government and Politics in East Asia: China (4) II. Kallgren**

Lecture—4 hours. 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.

**148B. Government and Politics in East Asia: Pacific Rim (4) I. Kallgren**

Lecture—4 hours. Prerequisite: course 2 recommended. Establishment and evolution of political cultures and establishment of political institutions in selected countries of the Pacific Rim namely Japan, Korea, Taiwan. Emphasis on post World War II.

**\*148C. Government and Politics in East Asia: Southeast Asia (4) III. Kallgren**

Lecture—3 hours; term paper. Prerequisite: course 2 recommended. Evolution of political culture, institutions, economy of selected nations in Southeast Asia including Vietnam plus two or three other examples. Emphasis on imperialist legacy, nation building in multi-ethnic communities, contrasts between socialist and non-socialist development models. Offered in even-numbered years.

**149. Politics of Development in East Africa (4) II. Rothchild**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 134 recommended. Analysis of the developmental process in the region of East Africa. Emphasis will be placed upon colonial impact, socioeconomic environment, strategies of development, party systems, bureaucracy and military coups. Course is considered part of a year-long interdepartmental sequence of courses on East Africa, which includes History 115B.

**150. Judicial Politics and Constitutional Interpretation** (4) II. Gates

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Politics of judicial policymaking; issues surrounding constitutional interpretation and decisionmaking; prerequisite for courses on the politics of constitutional law.

**151. The Constitutional Politics of the First Amendment and the Right to Privacy** (4) III. Gates

Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. 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.

**152. The Constitutional Politics of Equality** (4) III.

Dubois

Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. Constitutional politics of equality in the American political system; issues surrounding constitutional doctrine and judicial policymaking; special attention on racial and sexual equality. Offered in even-numbered years.

**153. The Constitutional Politics of the Justice System** (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 150. Constitutional politics of the American criminal justice system; the issues surrounding constitutional doctrine and judicial policymaking on issues such as search and seizure, arrest, trial, incarceration, and other issues of due process. Offered in odd-numbered years.

**154. Legal Philosophy** (4) III. Sinopoli

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Analysis of the nature and functions of law; law as an instrument of social control and the relationship between law and morality. Offered in even-numbered years.

**155. Judicial Process and Behavior** (4) II. Gates

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Analysis of the behavior of judges and courts in the political process. Techniques of judicial decisionmaking. Relationships among courts and other decision-making bodies. Offered in even-numbered years.

**\*156. Law and Society** (4) II. Gates

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing. Social basis and origins of law; relationship between law, institutions, and social change. Offered in odd-numbered years.

**160. American Political Parties** (4) I. Costantini

Lecture—3 hours; discussion—1 hour. 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.

**\*161. Comparative Political Parties** (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Organization, operation, governmental function and social bases of political parties especially in Great Britain and France but with some reference to other Western European countries.

**\*162. Elections and Voting Behavior** (4) III. The Staff

Lecture—3 hours; 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.

**163. Group Politics** (4) I. M. Jackman; II. Wade

Lecture—3 hours; discussion—1 hour. 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.

**164. Public Opinion** (4) II. Costantini

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing and course 1 or 5, or 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 signifi-

cance of that distribution for system stability and institutions. Opinion polling and its problems.

**165. Mass Media and Politics** (4) III. Costantini

Lecture—3 hours; discussion—1 hour. 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.

**166. Women in Politics** (4) III. The Staff

Lecture—3 hours; discussion—1 hour or seminar—1 hour. 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.

**\*167. Political Socialization** (4) II. Costantini

Lecture—3 hours; discussion—1 hour. Prerequisite: course 164 or consent of instructor. Who learns what about politics, and when and how they learn it. The process, content and sources of political learning, particularly in preadulthood, and the significance of such factors for the political system as well as for the development of the political self.

**168. Chicano Politics** (4) II. Riddell (Chicano Studies)

Lecture—3 hours; discussion—1 hour. Political aspects of Chicano life in America; examines the Chicano's political role as it has been historically defined by different groups in society and the Chicano's responses to his/her political environment.

**\*169. Political Elites** (4) I, II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 2, or 4, or consent of instructor. Background, careers, motives and beliefs of political leaders. Place of elites in a democratic polity; elite-mass differences; conflict and consensus among elites.

**\*170. Politics and Personality** (4) III. Berman

Lecture—3 hours; discussion—1 hour. How is conduct of politics influenced by personal qualities of political actors? Course focuses on developing criteria for analyzing political phenomena in psychological terms by examining selected writings of twentieth-century theorists and psychobiographies.

**171. The Politics of Energy** (4) II. Wandesforde-Smith

Lecture-discussion—4 hours. Prerequisite: upper division standing. Analysis of nature and performance of political processes for making energy choices at the international, national and state levels. Emphasizes interaction of energy policy with other political goals and the ability of governmental institutions to overcome constraints on policy innovation.

**172. Ideology of Class, Race, and Gender** (4) I. Jackman

Lecture—4 hours. 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?

**173. Community Power and Change** (4) II. M. Jackman

Lecture—3 hours; discussion—1 hour. An examination of the relationship between general community characteristics, the distribution of political power, and policy outputs in the United States. Alternative models of community political change are presented.

**174. Government and the Economy** (4) II. Skalaban

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. 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.

**175. Science, Technology, and Policy** (4) III. Hill

Lecture—3 hours; discussion—1 hour. Analysis of policy-making for science and the use of scientific expertise for making decisions about technology. Topics include funding of basic research, relation-

ship of science to technological development, science and military policy, technological risks, technology assessment and scientists and politics.

**176. Power and Coercion** (4) II. Jackman

Lecture—4 hours. Prerequisite: course 1 or Sociology 1 recommended. Examination of the meaning, sources, and diverse expressions of power and coercion in our lives. Concepts are explored by applying them to a broad range of issues, such as sexual harassment, racial subordination, legislative policy-making, and ideological hegemony.

**177. Modern Dictatorships** (4) III. Groth

Lecture—3 hours; term paper. Prerequisite: upper division standing in Political Science or consent of instructor. Selected political processes and institutions of dictatorships in Germany, Italy, Russia, Spain, Japan, and other states. Topics include executives, legislatures, parties, courts, bureaucracies, communications, and public opinion with comparisons to U.S. processes.

**178. Political Development in Modernizing Societies** (4) I. R. Jackman

Lecture—3 hours; discussion—1 hour. 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.

**179. Special Studies in Comparative Politics** (4) II, III. R. Jackman, Bahry

Seminar—4 hours. Prerequisite: consent of instructor and upper division standing. Intensive examination of one or more special problems appropriate to comparative politics. May be repeated once for credit.

**180. Bureaucracy in Modern Society** (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or 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.

**\*181. The American Administrative System** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in Political Science or consent of instructor. Introduction to the development and organization of administrative institutions in the American federal system; focus on design and reorganization, and the relationship of structure to performance, at the national, subnational, and local levels.

**182. Administrative Decision Making and Public Policy** (4) I. The Staff

Lecture—3 hours; special assignments. Approaches to and models of administrative decision making; techniques of substantive policy analysis; problems and developments in planning, budgeting, personnel, and administrative reform.

**183. Administrative Behavior** (4) I, II. Gable

Lecture—3 hours; discussion—1 hour. The implications for American public administration of evolving concepts about behavior in organizations.

**187. Administrative Theory** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Historical and critical analysis of the principal theories of organization and management of public agencies in the light of such concepts as decision making, bureaucracy, authority and power, communication and control; an examination of the role of government bureaucracies in the total society.

**\*188. Manpower Policy and Personnel Administration** (4) III. Gable

Lecture—3 hours; discussion—1 hour. Politics and economics of effective manpower programs; planning manpower needs; recruitment, selection, and administration of public personnel; training and development; unions and collective bargaining; affirmative action; ethics and morality in the public service.

**189. Politics of Budgeting and Finance Administration** (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Fiscal role of government in mixed economy and democratic society; politics of revenue and resource allocation; tax policy; inter-governmental financial relations; budget formulation and execution; alternative models of resource allocation; budget as a tool of management.

**\*190. International Relations** (4) II. Zinner

Lecture—2 hours; discussion—2 hours. Prerequisite: open to majors in International Relations, or consent of instructor. Analysis and evaluation of substantive issues in contemporary international relations. Readings drawn from current academic and non-academic periodicals.

**\*191. Special Studies in Local Government and Politics** (4) III. Sokolow

Lecture—3 hours; fieldwork—1 hour. Prerequisite: consent of instructor; enrollment limited to advanced students. Intensive study of one or more topics relating to urban policy and politics, designed for advanced students. Group projects and field work in one or more communities are emphasized.

**192A. Internship in Public Affairs** (5) I, II, III. The Staff (Chairperson in charge)

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.)

**192B. Internship in Public Affairs** (5) I, II, III. The Staff (Chairperson in charge)

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.)

**193. Research in Practical Politics** (2) I, II, III. The Staff

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.

**194HA-194HB-194HC. Special Study for Honors Students** (2-3-5) I, II, III. The Staff

Directed research. Prerequisite: major in Political Science or Political Science—Public Service with junior standing and overall grade-point average of 3.5. Directed reading, research, and writing culminating in the preparation of a senior honors thesis under direction of faculty adviser. (Deferred grading only, pending completion of sequence.)

**\*195. Special Studies in American Politics** (4) II.

The Staff 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 once for credit when different subject matter studied.

**196. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)**Graduate Courses****\*201. Urban Government and Politics** (4) I.

Sokolow

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, policy-making and political change. Offered in odd-numbered years.

**202. American State Government and Politics** (4)

I. Sokolow

Seminar—4 hours. Survey and analysis of the litera-

ture 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 even-numbered years.

**203. American National Government** (4) III.

Berman

Seminar—4 hours. Survey and analysis of the literature in the field of American Government. Emphasis upon development of methodologies for the study of American Government, and on the development of theories and concepts for understanding the behavior and performance of major national institutions.

**\*205. Field Research in Urban Politics and Policy**

(4) III. Sokolow

Seminar—2 hours; field research—2 hours. Examination of research design and methodologies appropriate to field research in community-level politics and policy, with an emphasis on elite interviewing and observation. Analysis of illustrative studies. Team participation in design, execution, and analysis of a field research project.

**\*207. Environmental Public Policy** (4) II. Wandeforde-Smith

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) III. Hill

Seminar—4 hours. Social science techniques applied to public policy formation and evaluation.

**209. The American Political System** (4) I, II. Wade, Hill

Seminar—4 hours. Analysis of selected theoretical and empirical issues posed by contemporary research in American government and politics.

**\*218. Political Theory** (4) III. Sinopoli

Seminar—3 hours.

**223. International Relations** (4) I. Siverson

Seminar—3 hours.

**\*225. The International System** (4) III. Siverson

Seminar—3 hours. 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.

**230. American Foreign Policy** (4) III. Goldman

Seminar—3 hours.

**\*231. U.S. Political Culture and Foreign Relations**

(4) I. Rothchild

Seminar—3 hours. 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 odd-numbered years.

**241. Communist Political Systems** (4) I. Bahry

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) II. Groth

Seminar—3 hours. Prerequisite: graduate status or consent of instructor. Systematic survey of theories and methods used in the study of Comparative Politics.

**246. Policymaking in Third-World Societies** (4) II.

Rothchild

Seminar—3 hours. Prerequisite: graduate standing or consent of instructor. Included in an analysis of policy making 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 odd-numbered years.

**248. Politics of East Asia** (4) III. Kallgren

Seminar—3 hours. Selected contemporary problems

of government and international relations in East Asia.

**\*260. Political Parties** (4) II. The Staff

Seminar—3 hours. Survey of selected topics in American and comparative parties.

**\*261. Political Behavior** (4) III. Costantini

Seminar—3 hours. Survey of selected topics in political behavior and public opinion.

**282. Concepts and Problems in Public Administration** (4) I. Gable

Seminar—4 hours. Nature of administrative processes in modern society; analysis of complex organizations; contemporary management practices and processes; means of controlling bureaucracy. Offered in even-numbered years.

**\*283. Organizational Behavior** (4) II. The Staff

Seminar—4 hours. Organizational behavior as it relates to public sector decision-making.

**\*286. Administrative Values** (4) III. The Staff

Seminar—3 hours. Examination of American administrative values. Offered in odd-numbered years.

**290A. Research in American Government and Public Policy**

(4) I, II, III. The Staff

Seminar—4 hours. Special research seminar on selected problems and issues in the study of American government and public policy.

**290B. Research in Political Theory** (4) I, II, III. The Staff

Seminar—4 hours. Special research seminar on selected problems and issues in the study of political theory.

**290C. Research in International Relations** (4) I, II, III. The Staff

Seminar—4 hours. Special research seminar on selected problems and issues in the study of international relations.

**290D. Research in Judicial Politics** (4) I, II, III. The Staff

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) I, II, III. The Staff

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) I, II, III. The Staff

Seminar—4 hours. Special research seminar on selected problems and issues in the study of comparative government and policy.

**290G. Research in Public Administration** (4) I, II, III. The Staff

Seminar—4 hours. Special research seminar on selected problems and issues in the study of public administration.

**297. Internships in Political Science** (2) I, II, III. The Staff

Seminar—2 hours. Prerequisite: open only to persons who have internships or other positions in governmental agencies, political parties, etc. Deals with the application and evaluation of theoretical concepts through work experience or systematic observation in public and political agencies. May be repeated for credit.

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)**299D. Directed Reading** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)**Professional Course****390. The Teaching of Political Science** (1) I, II, III.

The Staff

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.)

## Pomology

(College of Agricultural and Environmental Sciences)  
Adel A. Kader, Ph.D., Chairperson of the Department  
Department Office, 1045 Wickson Hall (916-752-0123)

### Faculty

James A. Beutel, M.S., Lecturer  
Fredrick A. Bliss, Ph.D., Professor  
Royce S. Bringhurst, Ph.D., Professor Emeritus  
Dillon S. Brown, Ph.D., Professor Emeritus  
Patrick H. Brown, Ph.D., Assistant Professor  
Robert M. Carlson, Ph.D., Lecturer  
Peter B. Catlin, Ph.D., Lecturer  
Julian C. Crane, Ph.D., Professor Emeritus  
Abhaya M. Dandekar, Ph.D., Assistant Professor  
Theodore M. DeJong, Ph.D., Associate Professor  
Louise Ferguson, Ph.D., Lecturer  
Thomas M. Gradziel, Ph.D., Assistant Professor  
William H. Griggs, Ph.D., Professor Emeritus  
Paul E. Hansche, Ph.D., Professor  
Hudson T. Hartmann, Ph.D., Professor Emeritus  
Scott Johnson, Ph.D., Lecturer  
Adel A. Kader, Ph.D., Professor  
Dale E. Kester, Ph.D., Professor  
John M. Labavitch, Ph.D., Professor  
Ormund Lilleland, Ph.D., Professor Emeritus  
George C. Martin, Ph.D., Professor  
Gale McGranahan, Ph.D., Lecturer  
Warren C. Micke, M.S., Lecturer  
F. Gordon Mitchell, M.S., Lecturer  
Dan E. Parfitt, Ph.D., Lecturer  
Vito S. Polito, Ph.D., Professor  
David E. Ramos, Ph.D., Lecturer  
Roger J. Romani, Ph.D., Professor  
Kay Ryugo, Ph.D., Professor Emeritus  
Kenneth A. Shackel, Ph.D., Assistant Professor  
Douglas V. Shaw, Ph.D., Assistant Professor  
Stephen M. Southwick, Ph.D., Lecturer  
Ellen G. Sutter, Ph.D., Associate Professor  
Kiyoto Uriu, Ph.D., Professor Emeritus  
Steven A. Weinbaum, Ph.D., Professor

**Related Major Programs.** See the majors in Plant Science and in Agricultural Science and Management (Plant Science option).

**Related Courses.** See Plant Science 109, 112, 112L, 113, 140, 196.

**Graduate Study.** For graduate study related to the field of pomology, see the M.S. degree program in Horticulture. See also the Graduate Division section in this catalog.

### Courses in Pomology

#### Lower Division Courses

##### 10. Fruit and Nut Crop Production and Utilization (3) I. Martin in charge

Lecture—2 hours; discussion—1 hour. Introduction to pomology including: climatic adaptation of deciduous fruits; orchard planning and management; tree nutrition and physiology; fruit development, maturation, and harvesting; protection from cold; quality, storage, transportation, and marketing.

##### 92. Internship in Pomology (1-12) I, II, III. The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-learn experience on and/or off campus in the production and management of orchard crops or closely related enterprises. (P/NP grading only.)

#### Upper Division Courses

##### 101. Tree Growth and Development (4) II. DeJong, Catlin

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1C or Plant Science 102 or consent of instructor. Physiology of fruit plant growth and

maintenance; species adaptation; responses to environment and cultural modification (pruning, soil and water management, etc.)

##### 102. Principles of Fruit Production (4) III. Weinbaum, Gradziel

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biological Sciences 1C or Plant Science 102. The course covers principles underlying cultural practices associated with fruit and nut production, including morphology and physiology of the developing buds, flowers and fruits. The course emphasis is on commercially important temperate zone species.

##### 103. Citrus and Other Subtropical Fruits (3) II. Shackel in charge

Lecture—3 hours; field trip(s). Prerequisite: Biological Sciences 1C. Subtropical fruits as important economic and nutritional resources; their origin, distribution, botanical nature, culture, production and utilization with particular emphasis on citrus but including avocados, dates, macadamias and various other species. Offered in odd-numbered years.

##### 107. Small Fruit Production (2) II. Shaw

Lecture—2 hours; two field trips arranged at mutual convenience. Prerequisite: Biological Sciences 1C or the equivalent. Strawberries (*Fragaria*), blackberries-raspberries (*Rubus*), blueberries-cranberries (*Vaccinium*), and currants-gooseberries (*Ribes*) as important nutritional resources; their origin, production and utilization with emphasis on recent progress in integrated management. Offered in even-numbered years.

##### 170A-170B-170C. Applied Pomology (2-2-2) I-II-III.

Ramos, Southwick, Micke, Martin

Lecture—seven 2-hour sessions; two full-day field trips. Prerequisite: introductory course in pomology or consent of instructor. Overview of production and handling of major pomological crops including a clinical study of important cultural and harvesting activities and problems associated with commercial fruit growing. Offered in odd-numbered years in fall quarter; offered in even-numbered years in winter and spring quarters.

##### 192. Internship in Pomology (1-12) I, II, III. The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-learn experience on and off campus in the production and management of orchard crops or closely related enterprises. (P/NP grading only.)

##### 198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor (P/NP grading only.)

##### 199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

#### Graduate Courses

##### 203. Current Perspectives in Fruit Tree Physiology (3) I. Weinbaum, DeJong

Lecture—2 hours; discussion—1 hour. Prerequisite: Biochemistry 101A-101B, Botany 111, 112 or Plant Science 102; courses 101 and 102. Current advances/concepts regarding physiological bases of developmental phenomena specific to and/or characteristic of deciduous perennial fruit plants. Offered in odd-numbered years.

##### 205. Water Relations and Mineral Nutrition of Deciduous Fruit Crops (4) III. Carlson, Shackel

Lecture—3 hours; two full-day field trips. Prerequisite: Soil Science 109, Botany 111, 112 or Plant Science 102. Development and distribution of roots, irrigation and water relations, mineral nutrient status, deficiencies and excesses, symptoms, use of tissue analysis, chelates and deficiency corrections as factors in orchard management. Offered in odd-numbered years.

##### 210. Fruit Morphology (4) III. Polito

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: Botany 105 or 111. Reproductive morphology of flowering plants with emphasis on tree-crop species. Topics include flower initiation and development, pollination and fertilization, fruit and seed development. Offered in even-numbered years.

#### 212. Postharvest Biology and Biotechnology of Fruits and Nuts (3) III. Kader, Mitchell

Lecture—3 hours. Prerequisite: Plant Science 112 or the equivalent. Review of postharvest biology of fruits and nuts in relation to biotechnological procedures used in handling, emphasizing research needs. Offered in odd-numbered years.

#### 220. Quantitative Genetics and Fruit Crop Improvement (3) II. Shaw

Lecture—3 hours; discussion—3 hours. Prerequisite: Genetics 105, Plant Science 113, and Agronomy 205A. Theory and application of quantitative genetic principles to the breeding, testing, and selection of horticultural crop plants. Topics include: heritability, selection using information from relatives, indirect selection, genetic correlations, multiple trait selection, inbreeding, crop stability, and field testing. Offered in odd-numbered years.

#### 290. Seminar (1) I, II, III. The Staff (Bliss, Martin, Carlson in charge)

Seminar—1 hour. (S/U grading only.)

#### 298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

#### 299. Research (1-12) I, II, III, Summer. The Staff (Chairperson in charge)

(S/U grading only.)

## Portuguese

### See Spanish

## Preventive Veterinary Medicine (A Graduate Program)

Tim E. Carpenter, Director of the Program

Group Office, 112 Surge-IV (916-752-2375/1376)

**Graduate Study.** The School of Veterinary Medicine offers a program of study and research leading to the Master's degree in Preventive Veterinary Medicine (M.P.V.M.). Detailed information on this program may be obtained by writing Tim Carpenter, Director, in the Department of Epidemiology and Preventive Veterinary Medicine.

**Director.** Tim E. Carpenter (Epidemiology and Preventive Medicine).

## Psychiatry

### See Medicine, School of

# Psychology

(College of Letters and Science)

Donald H. Owings, Ph.D., Chairperson of the Department  
Department Office, 149 Young Hall (916-752-1880)

## Faculty

Linda P. Acredolo, Ph.D., Professor  
Jarvis R. Bastian, Ph.D., Professor Emeritus  
Leo M. Chalupa, Ph.D., Professor  
Richard G. Coss, Ph.D., Professor  
William F. Dukes, Ph.D., Professor Emeritus  
Rebecca A. Eder, Ph.D., Assistant Professor  
Alan C. Elms, Ph.D., Professor  
Robert A. Emmons, Ph.D., Assistant Professor  
Karen P. Erickson, Ph.D., Professor  
Albert A. Harrison, Ph.D., Professor  
Kenneth R. Henry, Ph.D., Professor  
Joel T. Johnson, Ph.D., Associate Professor  
Neal E.A. Kroll, Ph.D., Professor  
Debra L. Long, M.S., Assistant Professor  
Joseph Lyons, Ph.D., Professor Emeritus  
Peter R. Marler, Ph.D., Professor  
William A. Mason, Ph.D., Professor  
Sally P. Mendoza, Ph.D., Assistant Professor  
G. Mitchell, Ph.D., Professor  
Robert M. Murphey, Ph.D., Professor  
Thomas Natsoulas, Ph.D., Professor  
Donald H. Owings, Ph.D., Professor  
Theodore E. Parks, Ph.D., Professor  
Robert B. Post, Ph.D., Associate Professor  
Stephanie A. Shields, Ph.D., Associate Professor  
Dean K. Simonton, Ph.D., Professor  
Robert Sommer, Ph.D., Professor  
Charles T. Tart, Ph.D., Professor

## The Major Programs

Psychology is both a science and a form of humanistic inquiry. It provides knowledge about human and animal behavior and constitutes a background for examining your own behavior and that of other people. The Psychology program has several objectives: it presents an introduction to the study of individual and group behavior; it provides a liberal arts major for students looking for employment in business, government, personnel work, or other fields directly after obtaining their bachelor's degree; and it prepares students for graduate study in various areas of psychology, leading to teaching, research, and applied work. (Counseling and other careers in psychology require graduate-level training.)

The Psychology program at UC Davis is extremely broad and represents a wide variety of interests. The courses are organized around three focal points: *Personality/Social* emphasizes the individual in the social environment and includes such topics as personality theory, social psychology, abnormal psychology, individual differences, developmental psychology, humanistic psychology, and motivation. *Psychobiology* emphasizes the biological correlates of behavior and includes such topics as sensory psychology, physiological psychology, and comparative psychology. *Perception/Cognition* emphasizes how information from the physical world is sensed, perceived and used, and stresses the roles of consciousness, language, perception and learning in making us what we are.

The Department offers both the Bachelor of Arts degree for the student interested in the liberal arts and the Bachelor of Science program geared for students with a keen interest in either biology or mathematics. Each program involves an introduction to each of the three areas of psychology. In addition to completing the required core courses, majors may also take specialty courses on topics such as gender, aging and maturity, environmental awareness, altered states of consciousness, and primate behavior.

A prerequisite for declaring a major in Psychology is to complete the following courses with a combined

grade point average of at least 2.50 (all courses must be taken for a letter grade):

Psychology 1, 41 .....	8 units
Statistics 13 or 102 .....	4 units
Biological Sciences 1A or Biological Sciences 10 and one course from Anthropology 1, Genetics 10, Physiology 10 .....	5 or 8 units
Sociology or cultural anthropology .....	4 units

## A.B. Major Requirements:

UNITS  
**Preparatory Subject Matter** ..... 21-25

Psychology 1 or the equivalent .....	4
Psychology 41 .....	4
Statistics 13 or 102 .....	4
Biological Sciences 1A; or a combination of Biological Sciences 10 and one course from Anthropology 1, Physiology 10, Genetics 10 .....	5-8
One course in sociology or cultural anthro- pology (may be lower or upper division), minimum of 4 units .....	4-5

(Strongly recommended that Psychology 41, Statistics 13, or 102 be completed before enrolling in upper division courses.)

**Depth Subject Matter** ..... 40

Two courses from two of the following three groups and one course from the remaining group .....	21-22
Group A: Psychology 130, 131, 132, 135, 136 .....	8
Group B: Psychology 108, 129, 134, 150 .....	10
Group C: Psychology 112, 143, 145, 147, 168 .....	4

Additional units to achieve a total of 40 upper  
division units in psychology ..... 18-19

(Psychology 103 strongly recommended for students  
who plan to do graduate work in any area of Psychology.)

**Total Units for the Major** ..... 61-65

## B.S. Major Requirements:

**Biology Emphasis** UNITS

**Preparatory Subject Matter** ..... 46-53

Psychology 1 or the equivalent .....	4
Psychology 41 .....	4
Statistics 13 or 102 .....	4
Mathematics 16A-16B or 21A-21B .....	6-8
Physics 10 or 5A-5C .....	4-8
Biological Sciences 1A, 1B .....	10
Chemistry 1A, 1B .....	10
One course in sociology or cultural anthro- pology (may be lower or upper division), minimum of 4 units .....	4-5

(Strongly recommended that Psychology 41 or Statistics 13 be completed before enrolling in upper division courses.)

**Depth Subject Matter** ..... 52-53

Seven Psychology courses distributed as  
specified: Group A: two courses from

130, 131, 132, 135, 136 .....

Group B: three courses from 108, 129, 134,  
150 .....

Group C: two courses from 112, 143, 145,  
147, 168 .....

Additional units to achieve a total of 40

upper division units in psychology ..... 9

Genetics 100 .....

Zoology 125 or 148 .....

Physiology 110 .....

Additional units to achieve a total of 20

upper division units .....

**Total Units for the Major** ..... 98-106

(Biology Emphasis) ..... 98-106

**Recommended:** Psychology 154, 180B, 199 (on a

psychobiological topic), Zoology 105, 106, Anthropology 154A, Environmental Studies 110. (Psychology 103 strongly recommended for students who plan to do graduate work in any area of Psychology.)

## Mathematics Emphasis

UNITS

**Preparatory Subject Matter** ..... 44-58

Psychology 1 or the equivalent .....

Psychology 41 .....

Statistics 13 or 102 .....

Mathematics 21A, 21B, 21C .....

Computer Science Engineering 30 or Engi-  
neering 5 .....

Chemistry 10 or 1A-1B or 4A-4B .....

Physics 10 or 5A-5C .....

Biological Sciences 1A; or a combination of

Biological Sciences 10 and one course

from Anthropology 1, Physiology 10,  
Genetics 10 .....

One course in sociology or cultural anthro-  
pology (may be lower or upper division),  
minimum of 4 units .....

(Strongly recommended that Psychology 41 or  
Statistics 13 be completed before enrolling in upper  
division courses.)

**Depth Subject Matter** ..... 47-48

Five Psychology courses, distributed as  
specified:

Group A: two courses from 130, 131, 132,  
135, 136 .....

Group B: two courses from 108, 129, 134,  
150 .....

Group C: one course from 112, 143, 145,  
147, 168 .....

Psychology 103 .....

One course from Psychology 105, 206,  
207 .....

Additional units to achieve a total of 40  
upper division units in psychology ..... 9

One course sequence from Statistics 106-  
108, 130A-130B, 131A-131B .....

**Total Units for the Major** ..... 91-106

(Mathematics Emphasis) .....

## Recommended for All Majors

Psychology 103 is strongly recommended for students  
who plan to do graduate work in any area of  
psychology. It is strongly recommended that Psychology  
41 or Statistics 13 be taken prior to enrolling  
in upper division courses.

**Major Advisers.** L. P. Acredolo, L. M. Chalupa, R. G. Coss, R. A. Eder, A. C. Elms, R. A. Emmons, K. P. Erickson, A. A. Harrison, K. R. Henry, J. T. Johnson, N. E. A. Kroll, D. L. Long, W. A. Mason, S. P. Mendoza, G. Mitchell, R. M. Murphey, T. Natsoulas, D. H. Owings, T. E. Parks, R. B. Post, S. A. Shields, D. K. Simonton, R. Sommer, C. T. Tart.

**Honors and Honors Program.** In order to be eligible for high or highest honors in Psychology, the student must both meet the college criteria 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. This project is to be written in thesis form and approved by the department.

## Minor Program Requirements:

UNITS

**Psychology** ..... 24

Psychology 1 or the equivalent .....

One course from each of the following three

groups .....

Group A: Psychology 130, 131, 132,  
135, 136 .....

Group B: Psychology 108, 129, 134,  
150 .....

Group C: Psychology 112, 143, 145,  
147, 168 .....

Additional units to achieve a total of 20

upper division units .....

**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 by writing the Graduate Adviser, Department of Psychology.

**Graduate Adviser.** See *Class Schedule and Room Directory*.

## Courses in Psychology

### Lower Division Courses

#### 1. General Psychology (4) I, II, III. The Staff

Lecture—4 hours. Introduction emphasizing empirical approaches. Focus on perception, cognition, personality and social psychology, and biological aspects of behavior. Only 2 units allowed to those who have taken course 15 or 16; no credit allowed to those who have taken both courses 15 and 16. (CAN Psy 2)

**15. Introductory Psychobiology** (3) I, II, III. The Staff  
Lecture—3 hours. Survey of genetic, evolutionary and physiological factors affecting behavior. Emphasis on biological and biosocial mechanisms for understanding people and their interaction with their environment. No credit allowed to students who have completed course 1. General Education credit for two-course sequence of non-GE courses (15-16) which will satisfy requirement for one GE course: Contemporary Societies/Introductory.

**16. Psychology and Modern Life** (3) I, II, III. The Staff  
Lecture—3 hours. Personality development, interpersonal relationships, and the relevance of psychology to social processes. No credit allowed to students who have completed course 1. General Education credit for two-course sequence of non-GE courses (15-16) which will satisfy requirement for one GE course: Contemporary Societies/Introductory.

**\*20. Freshman Psychology Seminar** (4) I, II, III. The Staff  
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) I, II, III.

Mitchell  
Lecture—4 hours. 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.

**98. Directed Group Study** (1-5) I, II, III. The Staff  
(Chairperson in charge)  
Primarily for lower division students. (P/NP grading only.)

**99. Special Study for Lower Division Students** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

### Upper Division Courses

#### 103. Advanced Research Design and Data Analysis

(5) III. Kroll, Johnson, Mitchell  
Lecture—5 hours. Prerequisite: course 41 and either Statistics 13 or 102. Design and analysis of psychological investigations and the interpretation of quantitative data in psychology.

#### 105. Statistical Inference from Psychological Experiments

(4) II. Kroll  
Lecture—4 hours. Prerequisite: course 103 or consent of instructor. Probability theory, sampling distributions, hypothesis testing, statistical inference, and nonparametric statistics, with applications in sensory, perceptual, comparative, physiological, and other areas of psychology.

#### 108. Physiological Psychology

(5) I, II, III. Chalupa, Henry, Mendoza  
Lecture—4 hours; laboratory—2 hours. Prerequisite: course 1; at least one zoology or physiology course recommended. Relationship of brain structure and function to emotion, motivation, perception, states of consciousness, language, learning, and memory in humans and other animals; introduction to methods of physiological psychology.

#### 112. Developmental Psychology

(4) I, II, III. Mitchell, Shields, Acredolo, Eder

Lecture—4 hours. Prerequisite: course 1. An ontogenetic account of human behavior through adolescence with emphasis on motor skills, mental abilities, motivation, and social interaction.

#### 114. Gender and Social Development

(4) III. Shields

Lecture—4 hours. Prerequisite: course 1. Biological and social factors that influence when and how psychological sex-related differences will be expressed in human development. Special attention to the scientific and social rationale which underlie the study of gender.

#### 115. Maturity and Aging

(4) II. The Staff

Lecture—4 hours. Prerequisite: course 112. Biological, cognitive, personological, and social aspects of the human life span between early maturity and death, in its theoretical, methodological, and empirical aspects.

#### 120. History of Psychology

(4) I, III. The Staff

Lecture—3 hours; term paper. Prerequisite: course 1; upper division standing or consent of instructor. Development of psychological thought and research in context of history of philosophy and science.

#### 129. Sensory Processes

(5) I, II, III. Henry, Mendoza

Lecture—4 hours; discussion, project, or term paper—1 hour. Prerequisite: course 1 or Biological Sciences 1B or consent of instructor. Psychobiology of sensory systems in man and other animals. Relationship of behavior to physiology, structure and function of the senses.

#### 130. Human Learning and Memory

(4) I, II, III. Kroll, Parks

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 and either Statistics 13 or 102 or course 41; or consent of instructor. Consideration of major theories of human learning and memory with critical examination of relevant experimental data.

#### 131. Perception

(4) I, II, III. Natsoulas, Parks, Post

Lecture—3 hours; independent library work. Prerequisite: course 1. The cognitive organizations related to measurable physical energy changes mediated through sensory channels. The perception of objects, space, motion, events.

#### 132. Language and Cognition

(4) I, II. The Staff

Lecture—4 hours. Prerequisite: course 1 or the equivalent, and 6 units of upper division work in psychology or linguistics. Zoological, cultural, and individual perspectives of linguistic actions; their production, perception, cognitive significance, and their roles in human conduct, enculturation, and cognitive development.

#### 134. Animal Learning and Motivation

(5) I, III. Coss

Lecture—5 hours. Prerequisite: course 1 or 15 or consent of instructor. General theories of phyletic differences in learning and motivation drawing upon data from laboratory and field observations. Innate physiological mechanisms, developmental changes, effects of conditioning and other constraints on these processes are examined.

#### 135. Psychology of Consciousness

(4) II, III. Natsoulas

Lecture—4 hours. Prerequisite: course 1. Consideration of major theories of consciousness, with critical examination of relevant experimental, clinical, and field data.

#### 136. Cognitive Psychology

(4) I, II, III. Kroll, Long

Lecture—3 hours; term paper. Prerequisite: course 1. Introduction to human information processing, mental representation and transformation, imagery, attention, concept formation, problem solving, and computer simulation.

#### 137. Altered States of Consciousness

(4) III. Tart

Lecture—4 hours. Prerequisite: course 1. Characteristics, uses, and abuses of altered states of consciousness from experiential, behavioral, physiological, and methodological perspectives. Topics typically include sleep, borderline states, dreams, meditation, hypnosis, autohypnosis, marijuana intoxication, psychedelic drugs, and mystical experiences.

#### 143. Human Emotion and Feeling

(4) II, III. Nat-soulas, Shields

Lecture—4 hours. Prerequisite: introductory psychology course. An introduction to current theories and research on emotion and bodily feelings with special reference to self-knowledge.

#### 144. Environmental Awareness

(4) I, II, III. Sommer, Coss

Lecture—4 hours. Prerequisite: course 1. Interactions of people with built environments. Research methods for evaluating designed environments and reviews of current research in environmental psychology.

#### 145. Social Psychology

(4) I, II, III. Simonton, Johnson

Lecture—4 hours. Prerequisite: course 1. 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.

#### 147. Personality Theory

(4) I, III. Elms, Emmons, Erickson

Lecture—4 hours. Prerequisite: course 1. The theories of Freud, Erikson, and other major twentieth-century approaches to personality.

#### 149. Gender and Human Reproduction

(4) I, III. Erickson

Lecture—4 hours. Prerequisite: course 1. The social psychology of human reproduction. Examines gender relations over the course of the individual's reproductive cycle.

#### 150. Comparative Psychology

(5) I, II, III. Mason, Owings, Mitchell

Lecture—4 hours; discussion or project—1 hour. Prerequisite: course 1 or 15 or consent of instructor. Perspectives in animal behavior: psychological, ethological, and social systems, with an emphasis on functional behavioral categories from the standpoint of adaptation and evolution.

#### \*154. Primate Psychology

(4) III. Mitchell

Lecture—4 hours. Prerequisite: course 15 or 150 or an equivalent course in biological sciences, and consent of instructor. Comparative survey of primate psychology, based primarily on laboratory experimentation in learning, communication, cognition, sensation, motivation, emotion, perception, and effects of early experience in many species of primates.

#### 160. Health Psychology

(4) II. Emmons

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 15. 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. Application of principles in laboratory exercises.

#### 165. Introduction to Clinical Psychology

(4) I, II, III. The Staff

Lecture—4 hours. Prerequisite: courses 1, 168, and either 112 or 145. Major theoretical formulations in the history of clinical psychology, from classical psychoanalysis to contemporary existentialism and behavior modification. Survey based on lectures, films, and tapes, of what clinical psychologists do, including methods of appraisal, professional roles, and approaches to treatment.

#### 168. Abnormal Psychology

(4) I, II, III. Emmons, Murphy, Sommer

Lecture—4 hours. Prerequisite: course 1. Descriptive and functional account of behavioral disorders, with primary consideration given to neurotic and psychotic behavior.

#### 171. Humanistic and Transpersonal Psychology

(4) II, III. Tart

Lecture—4 hours. Prerequisite: course 165 or the equivalent and consent of instructor. Survey, including lectures and demonstrations, of humanistic, and transpersonal movements in contemporary psychology. Theory, data, and techniques in the work of Maslow and others who emphasize creativity, self-actualization, and realization of human potential.

#### 175. Genius, Creativity, and Leadership

(4) II. Simonton

Lecture—4 hours. Prerequisite: course 1 or 16. The

phenomenon of genius is 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. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Psychology 15 and 16

**177. Psychobiography and Life History (4) II, III.**

Elms

Lecture—4 hours. Prerequisite: course 1 or 16 or consent of instructor. Case-history research as a nonquantitative approach to studying personality. Psychological interpretation of life histories of outstanding individuals in the arts, politics, science and other areas. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Psychology 15 and 16.

**180A. Research in General Experimental Psychology (4) III.** The Staff

Lecture—2 hours; laboratory—4 hours. Prerequisite: 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 once for credit when the content differs.

**180B. Research in Psychobiology (4) III.** The Staff

Lecture—2 hours; laboratory—4 hours. Prerequisite: four upper division Psychology courses and consent of instructor. Empirical research on selected topics in psychobiology (animal learning and motivation, comparative psychology, physiological psychology, sensory psychology, etc.). Content will vary from quarter to quarter. May be repeated once for credit when the specific content differs.

**\*180C. Research in Personality and Social Psychology (4) II.** The Staff

Lecture—2 hours; laboratory—4 hours. Prerequisite: 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 once for credit when the specific content differs.

**183. Organizational Psychology (4) I, II, III.** Harrison

Lecture—4 hours. Prerequisite: introductory psychology course.

Survey of interrelationships among psychological processes, interpersonal dynamics, and organizational forms. Topics include motivation, communication, decision making, leadership, personnel selection and training, stress and conflict, career development, organizational development, and organization-community relations.

**\*190. Seminar in Psychology (4) The Staff**

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.

**192. Fieldwork in Psychology (1-6) I, II, III.** Harrison

Fieldwork—3-18 hours; term paper. Prerequisite: upper division standing in psychology and consent of instructor. Supervising internship, off- and on-campus, in community and institutional settings. Credit not applicable toward 40 units of upper division psychology required of majors. May be repeated once for credit. Limited enrollment. (P/NP grading only.)

**197T. Tutoring in Psychology (1-3) I, II, III.** The Staff

Prerequisite: upper division standing and consent of instructor. Tutoring in Psychology Department courses. This course is intended for advanced undergraduate students who will lead discussion sections in Psychology courses. May be repeated for credit for a total of 8 units. No more than 6 units may count toward the Psychology major requirement. (P/NP grading only.)

**198. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses**

**200. Current Research Topics in Psychology (1) I.**

The Staff

Seminar—1 hour. Prerequisite: consent of instructor. A seminar designed to introduce students entering graduate work in the department to its ongoing research activities. (S/U grading only.)

**201. Research Preceptorship (4) I, II, III.** The Staff

Laboratory-discussion—6-9 hours. Prerequisite: consent of instructor. (S/U grading only.)

**205. Advanced Statistical Inference from Psychological Experiments (5) II.** Kroll

Lecture—5 hours; project and term paper. Prerequisite: graduate student standing and consent of instructor. Probability theory, sampling distributions, nonparametric statistics, statistical inference, and hypothesis testing. A term paper will be required which develops a research proposal with a detailed discussion of the statistical techniques to be employed.

**206. Statistical Analysis of Psychological Experiments (4) I.**

Lecture—4 hours. Prerequisite: course 103 or consent of instructor. Statistical analysis of data obtained with various experimental designs; analysis of variance and covariance, factorial and repeated measures, Latin square designs, and tests of trends.

**207. Multivariate Analysis of Correlational Data (4) III.** Simonton

Lecture—4 hours. Prerequisite: course 105 or 205. Because the techniques are implemented using statistical software, prior experience with computers is strongly recommended. Competence in basic algebra is assumed. Application of multiple regression, path analysis, factor analysis, and related methods to infer causal models from correlation matrices.

**\*208. Physiological Psychology (4) Chalupa, Henry**

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.

**\*212. Developmental Psychology (4) II.** Acredolo, Shields

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The original behavioral repertoire of the child and its subsequent development.

**220. Topics in the History of Psychology (4) I.** The Staff

Lecture—2 hours; seminar—2 hours. Prerequisite: graduate standing in Psychology or consent of instructor. A lecture-seminar on selected topics in the history of psychology, and on the applicability of early psychological theory and research to contemporary investigations.

**229. Sensory Processes (4) III.** Chalupa, Henry, Owings

Lecture—2 hours; seminar—2 hours. Prerequisite: graduate standing in Psychology and consent of instructor. A lecture-seminar on selected topics in the fields of sensory psychology and physiology with an emphasis on the biological correlates of sensory processes.

**\*230. Learning (4) Parks, Kroll**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theories of learning and memory as applied to the experimental study of simple and complex behavioral processes.

**231. Perception (4) I.** Natsoulas, Post

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Analysis of the role of perception in experience and its effects on behavior.

**245. Social Psychology (4) II.** Johnson

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in social psychology.

**247. Personality (4) III.** Emmons, Erickson

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in human personality.

**250. Comparative Psychology (4) I.** Mason

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The study of animal behavior in an evolutionary and comparative framework.

**\*251. Genetic Correlates of Behavior (4) III.** Murphrey

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and experiment in the genetic contributions to animal and human behavior.

**252. Seminar in Psychobiology (4) II.** Chalupa, Owings, Mendoza

Seminar—4 hours.

**263A-263B-263C. Topics in Cognitive Psychology (4) II, III.** Acredolo, Kroll, Long, Parks, Post, Tart

Seminar—4 hours. Selected topics in language processing, memory, perception, problem solving, and thinking, with an emphasis on the common underlying cognitive processes.

**\*264. Psycholinguistics (4) The Staff**

Seminar—4 hours.

**\*265. Psychology of Consciousness (4) Natsoulas**

Seminar—4 hours. Prerequisite: graduate standing in Psychology or consent of instructor. Theory and research in the psychology of consciousness.

**270A-C. Topics in Personality Psychology (4) II, III.** Elms, Emmons, Erickson

Seminar—4 hours. Prerequisite: graduate student standing in Psychology or consent of instructor. Critical study of a selected area of personality psychology.

**\*275. Attitude Formation and Change (4) III.** Elms

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Development of attitudes; theories of attitude change; relationships between attitudes and behavior.

**290. Seminar (4) I, II, III.** The Staff

Seminar—4 hours. Prerequisite: 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.

**298. Group Study (1-5) I, II, III.** The Staff

(S/U grading only.)

**299. Research (2-9) I, II, III.** The Staff

(S/U grading only.)

**299D. Dissertation Research (1-9) I, II, III.** The Staff

Prerequisite: consent of instructor. (S/U grading only.)

**Professional Course**

**390A-390B-390C. The Teaching of Psychology (4-2-4) I, II, III.** Murphrey

Seminar—2-4 hours. Prerequisite: graduate standing in psychology and consent of instructor. Practical experience in teaching. 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. (Deferred grading only, pending completion of sequence.)

## Radiological Sciences

(School of Veterinary Medicine)

Thomas G. Nyland, D.V.M., M.S., Chairperson of the Department

Department Office, 1114 Medical Science-1A  
(916-752-0184)

### Faculty

Marvin Goldman, Ph.D., Professor  
William J. Hornof, D.V.M., M.S., Associate Professor  
Philip D. Koblik, D.V.M., M.S., Assistant Professor  
Joe P. Morgan, D.V.M., Vet. Med. Dr., Professor  
Thomas G. Nyland, D.V.M., M.S., Associate Professor  
Timothy R. O'Brien, D.V.M., Ph.D., Professor  
Alain P. Théon, Dr. Med. Vet., Assistant Professor

### Part-Time Clinical Faculty

Larry Y. Kerr, D.V.M., Associate Clinical Professor  
Sam Silverman, D.V.M., Ph.D., Clinical Professor  
James Ticer, D.V.M., Ph.D., Associate Clinical Professor

## Courses in Radiological Sciences

### Upper Division Courses

#### 115. Bioenvironmental Consequences of Nuclear Technology (3) III. Goldman

Lecture—3 hours; field trips to nuclear power stations. Prerequisite: a course in biology. Biospheric implications of radio-nuclide and thermal effluents generated by nuclear technology. Hazards evaluation based on the predictions of the most sensitive physiological response. Offered in odd-numbered years. (Same course as Environmental Studies 115.)

#### 199. Special Study for Advanced Undergraduates (1-5) I, II, III. Radiology Staff

(P/NP grading only.)

### Graduate Courses

#### 269. Medical Radiobiology (3) II. Goldman

Lecture—3 hours. Prerequisite: introductory courses in physics, biochemistry, and physiology, or consent of instructor. Biological effects of radiation including genetic, teratogenic, carcinogenic responses in terms of dose quality and quantity. Included are discussions of dose-effect relationship, radiation therapy, environmental radioactivity, and radiation-protection criteria. Offered in even-numbered years.

#### 298. Group Study (1-5) I, II, III. Radiology Staff

(S/U grading only.)

#### 299. Research (1-12) I, II, III. Radiology Staff

(S/U grading only.)

### Professional Courses

#### 408. Special Procedures Rounds (2) I, II, III. The Staff

Discussion—6 hours. Prerequisite: a DVM degree and consent of instructor.† Review of selected radiology cases from previous day. Specific radiographic changes and differential diagnosis are discussed, with participants leading the discussions. Special procedures such as angiography; nuclear medicine and ultrasound examinations are reviewed. May be repeated for credit. (S/U grading only.)

#### 409. Known Case Conference (1.5) I, II, III. The Staff

Discussion-demonstration—1.5 hours. Prerequisite: a DVM degree and consent of the instructor.† Film review of current VM Teaching Hospital proven cases. Intended for Radiology residents and others with background in diagnostic radiology. May be repeated for credit. (S/U grading only.)

#### 410. Current Topics in Radiological Sciences (1.5)

I, II, III, IV. The Staff

Lecture—1.5 hours. Prerequisite: DVM degree or consent of instructor. Fundamentals of radiological sciences for radiology residents. Topics will include series of in-depth lectures covering the broad spectrum of veterinary radiology/radiological sciences and related alternate imaging modalities. Clinically oriented but also including relevant research material. (S/U grading only.)

## Radiology

### See Medicine, School of

## Range and Wildlands Science

### See Range and Wildlands Science, below; and Range Science

## Range and Wildlands Science

(College of Agricultural and Environmental Sciences)

### The Major Program

Range and Wildlands Science is the study of the biological and physical components of land resources which are used mostly for grazing domestic livestock, but which also provide wildlife habitats, watersheds, recreation, and open space.

The major provides background in the biological, physical, and social sciences. Comprehensive study in the plant, animal, soil, and resource sciences supplements the core of range management courses. Integration of the knowledge of a variety of specialized fields is learned as a basis for land management oriented toward the multiple use concept and the maintenance of environmental quality.

The field is broad and diverse. Graduates, especially those with some experience, may be employed as consultants, extension specialists, ranch managers, or ranchers. They may also qualify for the position of Range Conservationist in governmental agencies such as the Forest Service, Soil Conservation Service, and the Bureau of Land Management. If career work with such an agency is desired, it is recommended that trainee or apprenticeship experience with that agency be included in the major program of study as an internship. In addition, the training provided by this major should give an excellent background for natural resource management positions.

Job experience, in-service training, and formal education beyond the bachelor's degree may lead to advanced professional positions in research, education, or management.

### B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

UNITS

#### Written/Oral Expression ..... 7-8

See College requirement ..... 7-8

#### Preparatory Subject Matter ..... 63-67

Animal science (Animal Science 2) ..... 4

Biological sciences (Biological Sciences

1A, 1B, 1C) ..... 15

Chemistry (Chemistry 1A, 1B, 8A, 8B) ..... 16

Computer science (Agricultural Science

and Management 21, Engineering 5, or

Computer Science Engineering 10) ..... 3

Economic principles (Agricultural Eco-

nomics 1, Economics 1A, or 1B) ..... 4-5

Geology (Geology 1-1L) ..... 4

Mathematics (Mathematics 16A; 16B rec-

ommended) ..... 3-6

Physics (Physics 1A, 1B) ..... 6

Soil science (Soil Science 100) ..... 4

Statistics (Agricultural Science and Man-

agement 150) ..... 4

#### Breadth/General Education ..... 6-24

Satisfaction of General Education requirement to include two non-introductory courses in Agricultural Economics, Economics, Environmental Studies, or Geography

#### Depth Subject Matter ..... 51-56

Plant physiology (Botany 111 or Water Sci-

ence 104) ..... 3-4

Plant ecology (Botany 117 or Plant Science

101) ..... 4

Meteorology (Geography 3, Atmospheric

Science 105) ..... 3-4

Soil science, two upper division courses

..... 6-8

Watershed management (Water Science

141) ..... 3

Animal nutrition (Nutrition 115) ..... 4

Wildlife ecology or management, one upper

division course in wildlife and fisheries

biology, or zoology ..... 3-4

Forage crops (Agronomy 112) ..... 3

Select units from Range Science: ..... 18

Range and wildland plants (Range Sci-

ence 100) ..... 0

Range ecology (Range Science 133,

134, 135) ..... 0

Range field course (Range Science

105) ..... 0

Range livestock production (Range Sci-

ence 160) ..... 0

Revegetation of disturbed lands (Range

Science 145) ..... 0

Range Science 192, 198, 199 (not more

than a total of 3 units can be counted)

Aerial photo interpretation and remote sens-

ing (Geography 106) ..... 4

#### Restricted Electives ..... 6-8

Two upper division natural science or

applied biological science courses in

one or two of the following: animal sci-

ence, botany, entomology, genetics,

geography, mathematics, nematology,

plant pathology, plant science, resource

sciences, water science, or weed sci-

ence

#### Unrestricted Electives ..... 17-47

#### Total Units for the Major ..... 180

**Major Adviser.** J.W. Menke (Agronomy and Range Science).

Advising Center for the major is located in 137 Hunt Hall.

**Graduate Study.** See the Graduate Division section in this catalog.

## Range Science

(College of Agricultural and Environmental Sciences)

**Faculty.** See under the Department of Agronomy and Range Science.

**Major Program.** See the major, Range and Wild-

lands Science.

**Related Courses.** See Agronomy 112, Nutrition 115,

Resource Sciences 100, Soil Science 105, 120,

Wildlife and Fisheries Biology 151.

## Courses in Range Science

Questions pertaining to the following courses should be directed to the instructor or to the Advising Center, 137 Hunt Hall.

**Lower Division Course**

**92. Range Science Internship** (1-12) I, II, III, summer. The Staff (Department Chairperson in charge) Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-learn experience off or on campus in all subject areas pertaining to range management. Internships supervised by a member of the faculty. (P/NP grading only.)

**Upper Division Courses**

**100. Range and Wildland Plants** (4) III. Rice Lecture—2 hours; laboratory—6 hours; two Saturday field trips. Prerequisite: Biological Sciences 1C and junior standing recommended. Systematics, evolution, ecology and use of plants within range and wildland ecosystems. Taxonomy and identification of range and wildland grasses, woody perennials, legumes, and forbs.

**105. Field Course** (2) III. Menke

Lecture—10 hours total; laboratory—30 hours total (given week following end of spring quarter). Prerequisite: course in plant or range ecology. Field studies of rangeland vegetation as a livestock grazing resource and as wildlife habitat. Range management and improvement strategies for enhancing multiple-use carrying capacity: grazing systems, water developments, seeding of improved species, and prescribed fire. Considered a spring quarter course for preenrollment. Offered in even-numbered years.

**133. Grassland Ecology** (3) II. Raguse

Lecture—3 hours; one Saturday field trip. Prerequisite: course in plant ecology or consent of instructor. Structure, function and environment of North American grasslands, with emphasis on the California annual type. Concepts and problems in measuring primary and secondary productivity. Principles of grassland and management including vegetation improvement, utilization by animals, and recreation and aesthetic values. Offered in even-numbered years.

**134. Comparative Ecology of Major Rangeland Systems** (3) II. Menke

Lecture—3 hours; one Saturday field trip. Prerequisite: course 100 or the equivalent; general ecology course recommended. Study of vegetation structure, composition, and succession in representative North American rangeland plant communities. Description and comparison of interactions between vegetation and grazing animals on grassland, desert, forested, and tundra rangelands. Discussion of management strategies used in these systems today. Offered in odd-numbered years.

**135. Ecology and Community Structure of Grassland and Savanna Herbivores** (3) I. Demment Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or the equivalent; general ecology course 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 savanna systems. Offered in even-numbered years.

**\*145. Revegetation of Disturbed Lands** (2) II. The Staff

Lecture—2 hours. Prerequisite: Biological Sciences 1C and Soil Science 100. Principles of revegetation and specific applications. Topics include characteristics of disturbed sites, especially soil-related problems; techniques for mechanical stabilization, mulching, and seeding; and plant materials used. Integrates principles and techniques by use of specific case histories. Offered in odd-numbered years.

**160. Range Livestock Production** (3) III. Morris, Raguse

Lecture—3 hours. Prerequisite: Animal Science 2 and course 133. Application of principles of animal and range science to the extensive production of livestock and related products from range. Emphasis on beef and sheep production systems from perennial and annual range types. (Same course as Animal Science 160.)

**192. Range Science Internship** (1-12) I, II, III, summer. The Staff (Department Chairperson in charge) Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learn experience off or on campus in all subject areas pertaining to range management. Internships supervised by a member of the faculty. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Department Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Department Chairperson in charge) Prerequisite: senior standing and consent of instructor. (P/NP grading only.)

**Graduate Courses****208. Computer Modeling in Range and Crop Management** (3) I. Williams

Lecture—3 hours. Prerequisite: one course from Agronomy 205B, Animal Science 128, or Environmental Studies 128. Development of computer models involving dynamic simulation and optimization modes for range and crop management problems. Modeling philosophy, assumptions, implementation, validation, and experimentation emphasized. Offered in odd-numbered years.

**290. Seminar in Range Science** (1-2) II. Geng; III. Jones

Seminar—1-2 hours. Topics of current interest in grassland ecology, range and wildlands management, and related modeling and systems analysis.

**298. Group Study** (1-5) I, II, III. The Staff (Williams in charge)**299. Research** (1-12) I, II, III. The Staff (Williams in charge) (S/U grading only.)

The program provides training in reading critically and analytically, and encourages speculative thought on such primal questions as the purpose and meaning of human existence. Courses offered by the Religious Studies faculty emphasize close analysis of texts and therefore train minds rather than test memories. By focusing on the interactions between different traditions, the courses explore the foundations of each tradition and seek an understanding of the complexities, uniqueness, and similarities of the various religions.

**A.B. Major Requirements:**

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>28</b>
Anthropology 2 .....	4
Religious Studies 1, 2, 21, 40 .....	16
Religious Studies 23 or 60 .....	4
Religious Studies 4 or 70 .....	4
<b>Depth Subject Matter</b> .....	<b>40</b>
History 130A, 130B, 130C .....	12
Philosophy 105 .....	4
Anthropology 124 or Sociology 146 .....	4
Upper division courses in religious studies including 4 units each from Jewish studies, Christian studies, Oriental religions and general religious studies (Religious Studies 100, 110, 115, 150) .....	20
<b>Total Units for the Major</b> .....	<b>58</b>

**Course Equivalents**

The major advisers have a list of lower and upper division courses that can be substituted for courses suggested above.

**Recommended**

A reading knowledge of a foreign language is highly recommended. Consult major adviser for a complete list of recommended upper division courses.

**Major Advisers.** W.W. Lai, N. Janowitz, L. Hurst.

**Minor Program Requirements:**

The following four minor program options and others responsive to students' needs are subject to approval by the major adviser or the Curriculum Committee.

	UNITS
<b>Religious Studies</b> .....	<b>20</b>
<b>Religious Studies</b> emphasis	
Five courses chosen from Religious Studies 102, 110, 122, 124, 140, 141A or 141B or 141C, 168, 172 .....	20
<b>Oriental Religions</b> emphasis	
Religious Studies 70, 168, 172; and two courses from Religious Studies 110, History 191A, 194A .....	20
<b>Judaism</b> emphasis	
Religious Studies 23, 122, 124 .....	12
Two additional courses from Religious Studies 110, History 143, 144 .....	8
(Religious Studies 122 and 124 may be repeated for credit in a different subject area, and the second elective can replace one of the above three courses.)	

**Christian Studies** emphasis

Religious Studies 40, 102, 140, and two courses from Religious Studies 110, 141A, 141B, 141C, Philosophy 145, History 130A, 130B, 130C, 131B .....

**Preministerial Training**

Seminaries and professional theological schools, as a rule, do not prescribe any specific major program and give equal consideration to all qualified applicants completing a course of study that gives them a broad cultural background. A program combining the Preparatory Subject Matter for the A.B. degree in Religious Studies, with one of the A.B. degree curricula in the College of Letters and Science is an excellent preparation for most seminaries and professional theological schools. A reading knowledge of a foreign language is highly recommended.

Students interested in applying for admission to a theological school should consult the Religious Studies office and make an appointment with the preministerial adviser.

**Preministerial Adviser.** L. D. Hurst.

## Courses in Hebrew

### Lower Division Courses

#### 1. Elementary Classical Hebrew (5) I. The Staff

Lecture—4 hours; discussion—1 hour. Introduction to Hebrew alphabet, basic vocabulary, orthography, morphology and syntax. Readings from the Bible. (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.)

#### 2. Elementary Classical Hebrew (5) II. The Staff

Lecture—4 hours; discussion—1 hour. Prerequisite: course 1 or consent of instructor. Hebrew alphabet, basic vocabulary, orthography, morphology and syntax. Readings from Hebrew Bible. Continuation of course 1.

#### 3. Elementary Classical Hebrew (5) III. The Staff

Lecture—4 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Hebrew alphabet, basic vocabulary, orthography, morphology and syntax. Readings from Hebrew Bible and from post-Biblical Hebrew texts. Continuation of course 2.

## Courses in Religious Studies

### Lower Division Courses

#### 1. Survey of Religion (4) I. Janowitz; III. Lai

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. General Education credit: Contemporary Societies/Introductory.

#### 2. Myth, Ritual, and Symbolism (4) II. Janowitz

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. General Education credit: Contemporary Societies/Introductory.

#### \*4. Eastern Religions (4) I. Lai

Lecture—3 hours; discussion—1 hour. Eastern religions, including Hinduism, Buddhism, and Taoism from their origins to the present.

#### \*10. Introduction to Religious Studies (2) I, II, III.

The Staff (Chairperson in charge)

Lecture—2 hours. Topic of importance in more than one religious tradition as an illustration of the problems and methods of religious studies. May be repeated for credit in a different subject area.

#### \*18. Cosmology and Culture: Interactions

#### between Religion and Science (4) II. Griesemer

(Philosophy), Janowitz

Lecture—3 hours; discussion—1 hour. Prerequisite: one lower division course in philosophy or religious studies recommended. Interdisciplinary introduction to religious and scientific cosmologies, focusing on their interplay. Primary goal of course is to develop skills in analyzing cultural presuppositions and their fundamental role in science and religion. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any introductory GE course in philosophy or religious studies. (Same course as Philosophy 18.)

#### 21. Old Testament (4) II. Janowitz

Lecture-discussion—4 hours. Religion of Ancient Israel from the time of Abraham to the post-exilic period, as contained in the Hebrew Bible. Emphasis on such key Biblical themes and institutions as:

monotheism, revelation, law, covenant, holiness, creation, prophecy, priesthood, wisdom, and apocalypse. General Education credit: Civilization and Culture/Introductory.

#### 23. Basic Judaism (4) I. Janowitz

Lecture-discussion—4 hours. General overview of the traditional laws and customs of Judaism, with an introduction to the history, ethics, and underlying beliefs of Judaism. Course requires no prior knowledge of Judaism.

#### 40. New Testament (4) I, III. Hurst

Lecture—3 hours; discussion—1 hour. New Testament literature from critical, historical, and theological perspectives. General Education credit: Civilization and Culture/Introductory.

#### \*60. Introduction to Islam (4) II. The Staff

Lecture-discussion—4 hours. Introduction to topics at core of Islamic tradition including Muhammad, the Qur'an, Islamic law, Sufism and sects as well as to selected topics including Islamic revival.

#### 70. Introduction to Buddhism (4) I. Lai

Lecture—3 hours; term paper (30 hours minimum preparation). Lectures, readings, and discussions on the development of Buddhism in India, China, and Japan; its influence on various Far Eastern art forms.

#### \*75. Chinese Philosophy: An Introduction (3) II.

Lai

Lecture—2 hours; discussion—1 hour. Introduction to Chinese philosophy from classical to modern times: emphasis on basic metaphysics and its change over time, including Confucian humanism, Taoist cosmologies, the Han synthesis of Tao, Yin-yang and Five Elements; its impact on Buddhism, Sung new synthesis and conflict with the West. Offered in odd-numbered years.

#### 98. Directed Group Study (1-5) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor; primarily for lower division students. (P/NP grading only.)

#### 99. Special Study for Lower-Division Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

### Upper Division Courses

#### \*100. Study of Religion: Issues and Methods (4) II. Janowitz

Lecture—3 hours; term paper. Principal issues and methods of Religious Studies and associated fields.

#### 102. Christian Origins (4) I. Hurst

Lecture-discussion—3 hours; term paper. Prerequisite: course 40; course 23 recommended. Beginning of the Christian faith seen in relation to milieu in which it originated. Offered in odd-numbered years.

#### 110. Religious Biographies (4) I. Lai

Lecture-discussion—3 hours; term paper. Lives of selected religious leaders representative of different religious temperaments and historical traditions.

#### \*115. Mysticism (4) II. Janowitz

Lecture-discussion—4 hours. Prerequisite: one lower division Religious Studies course (except 10, 98, or 99). Course intended primarily for Religious Studies majors, with others admitted. Historical and descriptive analysis of selected mystical traditions, and of selected key figures; readings of representative mystical authors.

#### 122. Studies in Biblical Texts (4) III. Janowitz

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 once for credit in different subject area.

#### \*124. Topics in Judaism (4) I. Janowitz

Lecture—3 hours; term paper. Prerequisite: course 23. Examination of selected aspects of Jewish life, religion, or literature. May be repeated once for credit in different subject area.

#### \*125. Talmud (4) III. Janowitz

Lecture—3 hours; term paper. Prerequisite: course 23. Introduction to the Talmud covering: history of the Talmudic literature; types of Talmudic materials with special reference to narrative and law; place of the Talmud in Jewish life.

#### \*126A. Readings from the Rabbinic Literature (2) III. Janowitz

Seminar—2 hours. Prerequisite: course 125 or consent of instructor; reading knowledge of Hebrew helpful. Examination of selected Rabbinic texts from critical, historical, and theological perspectives. Texts relating to Biblical themes. (P/NP grading only.)

#### \*126B. Readings from the Rabbinic Literature (2) III. Janowitz

Seminar—2 hours. Prerequisite: course 125 or consent of instructor; reading knowledge of Hebrew helpful. Continuation of course 126A. Texts relating to the Second Commonwealth. (P/NP grading only.)

#### \*126C. Readings from the Rabbinic Literature (2) III. Janowitz

Seminar—2 hours. Prerequisite: course 125 or consent of instructor; reading knowledge of Hebrew helpful. Continuation of course 126B. Texts relating to the period of the Amoraim. (P/NP grading only.)

#### 140. Christian Theology (4) II. Hurst

Lecture-discussion—3 hours; term paper. Prerequisite: course 40; course 102 recommended. Historical and systematic introduction to Christian doctrine, with attention to divergent traditions and the problem of orthodoxy and heresy.

#### \*141A. New Testament Literature (4) II. Hurst

Lecture-discussion—4 hours. Prerequisite: course 40. 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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Comparative Literature 1, Integrated Studies 2B, Philosophy 1, or Religious Studies 40.

#### 141B. New Testament Literature (4) II. Hurst

Lecture-discussion—4 hours. Prerequisite: course 40. 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 141A, 141C. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Comparative Literature 1, Integrated Studies 2B, Philosophy 1, or Religious Studies 40.

#### \*141C. New Testament Literature (4) III. The Staff

Lecture—4 hours. Prerequisite: course 40. 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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Comparative Literature 1, Integrated Studies 2B, Philosophy 1, or Religious Studies 40.

#### \*145. Contemporary American Religion (4) II. The Staff

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. Offered in odd-numbered years.

#### 150. Religious Ethics (4) II. The Staff

Lecture-discussion—4 hours. Prerequisite: course 4. Study of the religious bases to ethics through concentration on the ethical tracts of one major tradition, or through a comparison of the attitudes of two or more traditions to a common ethical issue. Offered every three years.

#### \*168. Hinduism (4) III. Lai

Lecture—3 hours; term paper. Prerequisite: course 4. 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. Offered in even-numbered years.

#### 172. Ch'an (Zen) Buddhism (4) III. Lai

Lecture-discussion—3 hours; term paper. Prerequisite: course 4 recommended. Doctrines and methods of the Patriarchs and great masters, both ancient and modern in the framework of the orthodox Buddhist tradition. Doctrinal basis of meditational techniques.

#### 189. Senior Colloquium (4) II. The Staff (Chairperson in charge)

Seminar—3 hours; term paper. Prerequisite: consent of instructor. Primarily for seniors in Religious Stud-

ies. Discussion in depth of a problem in religion which requires the methods of several disciplines and is important in the encounter between religions.

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: upper division standing and consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

## Renewable Natural Resources

### See Resource Sciences

## Reproduction

(School of Veterinary Medicine)

George H. Stabenfeldt, D.V.M., Ph.D., Chairperson of the Department

Department Office, 1136 Medical Science I (916-752-1358)

#### Faculty

David M. Baldwin, Ph.D., Associate Professor in Residence

Domenico Bernoco, D.V.M., Libera Docenza, Associate Professor

Robert H. BonDurant, D.V.M., Professor Ann Trommershausen Bowling, Ph.D., Adjunct Professor

Edward C. Feldman, D.V.M., Professor

John P. Hughes, D.V.M., Professor

Bill L. Lasley, Ph.D., Professor in Residence

Irwin K. M. Liu, D.V.M., Ph.D., Professor

James Murray, Ph.D., Associate Professor (*Reproduction, Animal Science*)

George H. Stabenfeldt, D.V.M., Ph.D., Professor

Clyde J. Stormont, Ph.D., Professor Emeritus

#### Part-Time Clinical Faculty

Conrad Ferreira, D.V.M., Assistant Clinical Professor

Walter Guterbock, D.V.M., Assistant Clinical Professor

Bob Harmon, D.V.M., Assistant Clinical Professor

James R. Howard, D.V.M., Associate Clinical Professor

Terry Lehenbauer, D.V.M., Assistant Clinical Professor

Michael McClosky, D.V.M., Assistant Clinical Professor

Gerald R. Mitchell, D.V.M., Associate Clinical Professor

Frank A. Mongini, D.V.M., Associate Clinical Professor

Jack W. Morse, D.V.M., Associate Clinical Professor

Carlos Risco, D.V.M., Assistant Clinical Professor

Frank N. Walton, D.V.M., Assistant Clinical Professor

John E. Zimmerman, D.V.M., Assistant Clinical Professor

## Courses in Reproduction

### Lower Division Course

#### 92. Work-Learn Experience in Veterinary Science

(1-4) I, II, III. The Staff (Stabenfeldt in charge) 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-study experience in Reproduction. (P/NP grading only.)

### Upper Division Courses

#### 111. Immunogenetic and Electrophoretic Techniques

(2) I. Bernoco Lecture—1 hour; laboratory—3 hours. Prerequisite: Genetics 100 (or the equivalent), or consent of

instructor. Immunologic and electrophoretic techniques used in the exploration of heritable differences in red cell antigens, serum proteins, and enzymes of domestic animals.

#### 192. Work-Learn Experience in Veterinary Science

(1-12) I, II, III. The Staff 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-study experience in Reproduction. May be repeated for credit. (P/NP grading only.)

#### 199. Special Study for Advanced Undergraduates

(1-5) I, II, III. The Staff (Stabenfeldt in charge) (P/NP grading only.)

### Graduate Courses

#### 231. Pathophysiology of Mammalian Reproductive Processes

(3) III. Stabenfeldt Lecture—3 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Physiological and pathological aspects of reproductive failure in mammals concerning gonadal function, fertilization, implantation, prenatal mortality, neonatal mortality, environmental factors, anatomical and hereditary defects, intersexuality and behavior. Offered in odd-numbered years.

#### \*290. Seminar

(1) I, II, III. The Staff Seminar—1 hour. Discussion of current topics in animal reproduction and medicine, as well as presentation of research findings by graduate students and faculty. May be repeated for credit. (S/U grading only.)

#### 292. Current Topics in Reproduction

(1) I, II, III. The Staff (Stabenfeldt in charge) Seminar—1 hour. Prerequisite: consent of instructor. Discussion of current scientific literature in reproduction, as well as presentation of research findings by graduate students and faculty. (S/U grading only.)

#### 298. Group Study

(1-5) I, II, III. The Staff (Stabenfeldt in charge)

#### 299. Research

(1-12) I, II, III. The Staff (S/U grading only.)

## Resource Sciences

(College of Agricultural and Environmental Sciences)

**Faculty.** See under departments of Agricultural Economics, Agronomy and Range Science, and Land, Air and Water Resources.

### The Major Program

The Resource Sciences major is a program for study of the physical, chemical and biological features of renewable natural resources, and the economic and social considerations associated with their use, protection, and management. Students who choose this major include those with interest in careers associated with resource utilization and management, as well as those pursuing post baccalaureate, academic, or professional training.

The curriculum for the major provides flexibility in meeting individual needs, interests, and objectives. But, at the same time, certain courses are required in the basic physical and biological science areas. An upper division general resource sciences course, a resource economics course, and a specified number of units of resource-oriented courses are required for all students in the major. Resource-oriented courses shall be selected in consultation with and with the approval of the student's adviser. Considerable care should be taken to insure effective utilization of the flexibility of the major, to meet individual academic and career objectives. In addition, supportive courses are selected to acquire additional knowledge and skills.

Positions now held by graduates in Resource Sciences are quite varied, but many are employed as resource analysts and planners as well as technical and environmental staff specialists with government

agencies, municipalities and private firms. A significant proportion of graduates undertake further studies leading to advanced degrees in resources, the environment and related fields.

### B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. Courses shown without parentheses are required.)

	UNITS
<b>Written/Oral Expression</b>	11-12
See College requirement	8
Additional English (English 103D, 103E or 104)	3-4
<b>Preparatory Subject Matter</b>	59-67
Atmospheric science (Geography 3 or Atmospheric Science 60)	4
Biological sciences (Biological Sciences 1A-1B-1C)	15
Chemistry (Chemistry 1A-1B)	10
Computer science (Agricultural Science and Management 21; and Agricultural Science and Management 121, Computer Science Engineering 10 or 30)	6
Environmental quality (Environmental Toxicology 10 or 101)	3-4
Geology (Geology 1 or 50)	3-4
Mathematics (Mathematics 16A-16B)	6
Physics (Physics 1A-1B, or 5A-5B-5C for quantitative resource management emphasis)	6-12
Other (additional courses in animal and plant sciences, mathematics and physical sciences with adviser's approval)	6
<b>Breadth/General Education</b>	6-24
Satisfaction of General Education requirement to include two non-introductory courses in Agricultural Economics, Economics, Environmental Studies, or Geography	
<b>Depth Subject Matter</b>	54-58
Resource Sciences 100	4
Soil Science 100	4
Water Science 100	4
Agricultural Economics 147 or 148	3-4
Resource-oriented courses selected with adviser's approval	24
Written expression (in addition to college requirement), (English 103D, 103E, 104)	3
Quantitative skills (Agricultural Science and Management 150, Environmental Studies 123, Statistics 106, 108)	3-4
Social-political awareness in resource sciences (Environmental Studies 160, 161; Environmental Toxicology 138, Geography 161, Geology 134, Water Science 150, Wildlife and Fisheries Biology 151)	3-4
Plant or animal ecology (Botany 117, Entomology 104, Environmental Studies 100, Plant Science 101, Zoology 125)	3-4
Special study or internship (Resource Sciences 190, 192, 198, 199)	3
<b>Unrestricted electives</b>	19-50
<b>Total Units for the Degree</b>	180
<b>Related Courses.</b> For courses that are related to this major see course listings for Agricultural Economics, Agricultural Science and Management, Animal Science, Botany, Entomology, Environmental Biology and Management, Environmental Studies, Environmental Toxicology, Geography, Geology, Range Management, Soil Science, Water Science, Wildlife and Fisheries Biology, and Zoology.	
<b>Major Adviser.</b> (Agronomy and Range	

Science, 249A Hunt Hall).

**Advising Center** for the major is located in 122 Hoagland Hall (916-752-1669).

## Courses in Resource Sciences

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 122 Hoagland Hall (916-752-1669).

### Lower Division Courses

#### 2. Concepts in Forestry (3) II. Hartsough

Lecture—2 hours; discussion—1 hour. Prerequisite: Biological Sciences 10 or Chemistry 10. Introduction to the physical, biological and ecological factors that give the forest its character and examination of social and economic factors governing forest management. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10 or Chemistry 10.

#### 3. Energy and the Environment (3) I, II. Flocchini, Walker

Lecture—3 hours. Prerequisite: Biological Sciences 10, Chemistry 10, Physics 10 or one equivalent course. Energy resources, their global distribution and the social, economic, political and environmental factors influencing utilization. Roles of hydro, solar, biomass, geothermal, nuclear and fossil fuels in meeting California's energy requirements. General Education credit with concurrent enrollment in course 3G: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10, Chemistry 10, or Physics 10.

#### 3G. Energy and the Environment Discussion (1) I, II.

Discussion—1 hour. Prerequisite: course 3 concurrently.

Critical, methodical, and analytical study of issues dealing with energy-environment interactions.

General Education credit with concurrent enrollment in course 3: Nature and Environment/ Non-Introductory.

Recommended GE preparation: see course 3 above.

#### 3L. Energy, Society and Environment Laboratory

(2) I. Flocchini, Walker

Discussion—1 hour; laboratory—3 hours; Saturday

field trips. Prerequisite: course 3. Field trips to examine nuclear, solar, fossil fuel, hydroelectric, wind, geothermal and cogeneration energy conversion

facilities.

#### 10. California: The State (3) I, III. Walker

Lecture—3 hours. Prerequisite: introductory geology or geography recommended. Introduction to geomorphology, physiography and natural resources of California. Interrelated impacts of terrain, climate and resources upon essential human activities. Analysis of the fundamental concepts and methods of inquiry guiding existing resource management policies. General Education credit with concurrent enrollment in course 10G: Contemporary Societies/Non-Introductory. Recommended GE preparation: Geography 5-5G.

#### 10G. California: The State (Discussion) (1) I, III.

Walker

Discussion—1 hour; brief essays. Prerequisite: course 10 concurrently. Small group discussion of topics assigned for course 10. Preparation and discussion of essays. General Education credit with concurrent enrollment in course 10: Contemporary Societies/Non-Introductory. Recommended GE preparation: see course 10.

#### 92. Resource Sciences Internship (1-12) I, II, III.

The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work-learn experience off and on campus in resource sciences. Internship supervised by a member of the faculty. (P/NP grading only.)

#### 98. Directed Group Study (1-5) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor. Primarily for lower division students. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-5) I, II, III.

The Staff (Chairperson in charge)

(P/NP grading only.)

### Upper Division Courses

#### 100. Concepts in Renewable Natural Resources (4) II. Walker

Lecture—3 hours; discussion—1 hour. Prerequisite: junior standing or consent of instructor. A survey of renewable natural resources, including relationships among soil, water, air, energy, plants, animals and society. Role of man in resource management, preservation and improvement for provision of food, fiber, environmental enhancement and recreation.

#### 101. Agriculture and Wildlife (3) II. Demment

Lecture—3 hours; two Saturday field trips. Prerequisite: upper division standing or consent of instructor. Study of the Central California Valley and the Delta region as an example of utilization for production, agriculture, and outdoor recreation—the conflicts and harmonies; lectures by distinguished biologists of the University and the State Department of Fish and Game.

#### 103. Renewable Energy Resource (3) II. Flocchini

Lecture—3 hours. Prerequisite: course 3. Characteristics of solar energy; energy balance of structures; analysis of systems for heating water and air; air conditioning systems; electricity from the sun; biomass conversion; wind power.

#### 112. California by Air (3) III. Walker

Lecture—1 hour; discussion—2 hours; laboratory—one Friday or Saturday flight; individual study projects and written and oral reports. Prerequisite: course 10 (may be taken concurrently) and one introductory course in geology or a course in physical geography. Issues in use of natural resources; social and environmental effects of using specific resources; analysis of strategies designed to assure continuation of resource availability. (\$60 laboratory fee.)

#### 131. Air as a Resource (3) I. Flocchini

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. General Education credit: Nature and Environment/ Non-Introductory. Recommended GE preparation: Chemistry 10.

#### 190. Seminar on Alternatives in Agriculture (2) II.

The Staff (Chairperson in charge)

Seminar—2 hours. Seminar on alternative points of view regarding agronomic, economic and public policy aspects of current and future agricultural systems. (P/NP grading only.)

#### 192. Resource Sciences Internship (1-12) I, II, III.

The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learn experience off and on campus in resource sciences. Internship supervised by a member of the faculty. (P/NP grading only.)

#### 198. Directed Group Study (1-5) I, II, III. The Staff

(Chairperson in charge)

(P/NP grading only.)

#### 199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Graduate Course

#### 203. Solar Energy Conversion Processes (3) II.

Flocchini

Lecture—3 hours. Prerequisite: course 103, Mathematics 16C. Forms of solar energy; solar energy climatology; heat transfer; analysis of systems for space heating and cooling. Offered in odd-numbered years.

## Rhetoric and Communication

**363**

## Rhetoric and Communication

(College of Letters and Science)

Michael T. Motley, Ph.D., Chairperson of the Department

Department Office, 224 AOB 4 (916-752-1221)

### Faculty

4 Don P. Abbott, Ph.D., Associate Professor

3 Rina Alcalay, Ph.D., Assistant Professor

Leslie A. Baxter, Ph.D., Professor

2 Robert A. Bell, Ph.D., Associate Professor

Carole Blair, Ph.D., Assistant Professor

John J. Foldy, Ph.D., Lecturer

Jay M. Marshall, Ph.D., Lecturer

Mark P. Moore, Ph.D., Lecturer

4 Michael T. Motley, Ph.D., Professor

James J. Murphy, Ph.D., Professor

Ralph S. Pomeroy, Ph.D., Associate Professor

John L. Vohs, M.A., Senior Lecturer

Sally J. Widenmann, M.A., Lecturer

### The Major Program

The major in Rhetoric and Communication centers on human beings as communicators, on the ways in which messages and their uses influence our lives. Course offerings allow the student to explore all facets of the communication process, from interpersonal communication through the rhetoric of film, and from major theories through the close analysis of particular messages. The centrality of communication in our lives is the basis for the program, and although specific courses may have quite varied emphases, all are designed to focus attention on communication. The sequence of required courses is designed to establish a coherent and systematic foundation from which the student can proceed in ways suited to individual interests. Whatever those interests, the major program can become an organizing principle, and in reporting research, students are asked to use the study of communication as a perspective for understanding themselves and their cultural inheritance.

Because of the general orientation and because communication is so basic to education, rhetoric and communication courses can be profitable to any student in any major, and the profit can extend far beyond the immediate scope of a university education. Students who have majored in rhetoric and communication have found that the program has opened a broad vista of career opportunities. Some have entered the job market directly and are pursuing careers in journalism, broadcasting, public relations, advertising, personnel, and sales. Some have chosen to do graduate work in the field, others in studies ranging from business administration to law and even to medicine. It is impossible to exhaust the possibilities, for in both public and private sectors, opportunities continue to develop for those who have a sound liberal education and who have prepared themselves with special attention to the uses of communication.

### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>8</b>
Rhetoric and Communication 1, 3.....	8
<b>Depth Subject Matter</b> .....	<b>44</b>
Rhetoric and Communication 110, 114, 115, 120 .....	16
One course from each of the following five groups.....	20
(a) Rhetoric and Communication 103, 105, 107	
(b) Rhetoric and Communication 111, 112, 113	
(c) Rhetoric and Communication 121, 122, 123, 125	

(d) Rhetoric and Communication 130, 134, 136, 152
(e) Rhetoric and Communication 140, 141, 143
Two additional upper division courses in Rhetoric and Communication .....8
<b>Total Units for the Major .....52</b>

**Letter Grades.** Courses to satisfy major requirements should be taken with letter grades, except for variable unit courses.

**Advising Office.** Room 218, AOB 4

### Minor Program Requirements:

	UNITS
<b>Rhetoric and Communication .....24</b>	
One course from Rhetoric and Communication 1, 3, 51 .....4	
A coherent sequence of at least five upper division courses in rhetoric and communication selected with the approval of a minor adviser .....20	

**Graduate Study.** The Department of Rhetoric and Communication offers programs of study and research leading to the M.A. degree in Rhetoric and Communication. Detailed information may be obtained from the Graduate Adviser, Department of Rhetoric and Communication.

**Graduate Adviser.** R. A. Bell.

### Courses in Rhetoric and Communication

**Subject A.** Students must have passed the Subject A requirement before taking any course in Rhetoric and Communication.

#### Lower Division Courses

**1. Introduction to Public Speaking (4) I, II, III.** The Staff  
Lecture—1 hour; discussion—3 hours. Practice in the preparation and delivery of speeches with an introduction to rhetorical theory and criticism as applied to public address. (CAN Spch 4)

**3. Group Communication (4) I, II, III.** The Staff (Chairperson in charge)  
Lecture-discussion—4 hours. Study of communication in small group situations. Role of communication in various group processes, including leadership and decision-making. Participation in group activities and simulation exercises.

**\*10. Introduction to Communication Studies (3)**  
Lecture—3 hours. Introduction to the nature and function of human communication, special reference to messages, sending, receiving, and channels.

**\*42. Rhetoric in the News Media (4)**  
Lecture-discussion—4 hours. Study of rhetorical concepts and processes influencing the news function of television, radio, newspapers, and mass circulation periodicals. Discussions, lectures, and group projects on problems of media bias, objective reporting, feature writing, and editorial responsibility. Critical analysis of journalistic styles.

**51. Introduction to Advocacy (4) II.** Pomeroy  
Lecture—4 hours. Introduction to the rhetoric of controversy, with emphasis upon the nature of public debate, the analysis of issues, and the logical presentation of evidence in support of arguments. (CAN Spch 6)

**99. Special Study for Undergraduates (1-5) I, II, III.**  
The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

#### Upper Division Courses

**\*100. Rhetorical Research (4)**  
Lecture—2 hours; discussion—2 hours; term paper. Prerequisite: upper division standing. Aspects of conducting and reporting research in rhetoric and communication. Emphasizes organization and writing style.

**103. Analysis of Message Systems (4) II.** Baxter  
Lecture—4 hours. Examination of elements of the communication process, including sources, messages, media, and receivers. Study of the role of these elements as they are influenced by various communicative situations.

#### 105. Semantic and Pragmatic Functions of Language (4) I, III.

Lecture—4 hours. Prerequisite: course 115. The role of language in shaping attitudes and perceptions of self and others. The use and abuse of verbal symbols in communicative situations. Concepts of meaning in discourse.

#### \*107. Conversational Analysis (4)

Lecture—4 hours. Prerequisite: course 115. Examination of research studies on conversations. Methods for collecting, transcribing and recording naturally occurring conversations for analysis. Study of social impact of rule observance and nonobservance.

#### 110. Origins of Rhetoric (4) I, II.

Murphy, Abbott  
Lecture-discussion—4 hours. Prerequisite: course in ancient history recommended. 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. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: History 4A.

#### 111. Medieval and Renaissance Rhetorical Theory (4) II.

Murphy  
Lecture—2 hours; discussion—2 hours. Development of the European rhetorical tradition from Saint Augustine to A.D. 1700. Attention to the three medieval rhetorical genres, the medieval university, the impact of printing, changes in Renaissance concepts of knowledge as they affected rhetoric.

#### 112. Early Modern Rhetorical Theory (4) I.

Pomeroy  
Lecture—4 hours. English and continental theories of rhetoric to 1900, with reference to developments in psychology, philosophy, and belles-lettres. Emphasis upon the works of Ward, Priestley, Campbell, Blair, and Whately.

#### \*113. Current Humanistic Trends in Rhetorical Theory (4) III.

Abbott  
Lecture—4 hours. Contemporary developments in traditional rhetorical concepts such as style, meaning, theory of argument, and persuasion.

#### 114. Contemporary Theories of Human Communication (4) II, III.

Lecture-discussion—4 hours. Rhetoric as a social science, characteristics of social theories, components of theories, development and testing of hypothesis, general models, theories, and research.

#### 115. Empirical Methods in Communication (4) I, II.

Baxter, Vohs  
Lecture—4 hours. Interpretation of formal and informal scientific reports via the logic and methods of scientific inquiry, with emphasis on experimental and descriptive research in communication.

#### 120. Rhetorical Criticism (4) I, II, III.

Moore, Blair  
Lecture—4 hours. Survey of critical methods and their use in the interpretation of rhetorical discourse.

#### 121. Public Address in Western Culture (4) II.

Pomeroy  
Lecture-discussion—4 hours. Notable and representative speeches from antiquity to the present. Speeches are examined both as dynamic and significant events in their historical contexts, and as noted instances of rhetorical art.

#### \*122. Public Discourse in American Culture (4)

Lecture—4 hours. Major individuals, movements, and media. Case studies of rhetoric as it has contributed to and is influenced by American culture. Variable content; may be repeated once for credit.

#### 123. The Persuasive Campaign (4) III.

Moore  
Lecture—4 hours; class project. Study of selected political and nonpolitical campaigns, illustrating prolonged organized efforts to change, maintain, or deter designated behaviors in a given audience through the use of a variety of media and influences.

#### 125. Freedom of Speech (4) I.

Abbott  
Lecture-discussion—4 hours. Historical developments of and contemporary controversies in freedom of speech. Political dissent, symbolic speech, slander and obscenity. Offered in odd-numbered years.

#### 130. Group Communication Processes (4) III.

Vohs  
Lecture—4 hours. Examination of current theories of group formation, goals, structure, and leadership, as they relate to communication processes.

#### 134. Interpersonal Communication (4) II.

Lecture—4 hours. Prerequisite: course 1, 3, or 10, or the equivalent. Communication between two individuals in social and task settings. One-to-one communication, verbal and nonverbal, in developing relationships. Consideration of theory and research on relevant variables such as shyness, self-disclosure, reciprocity, games, and conflict.

#### 136. Organizational Communication (4) I.

Vohs  
Lecture—4 hours. Examines communication in various organizational situations. Focuses on the use of effective communication strategies for achieving organizational and individual goals. Emphasis is placed on identifying and amending ineffective communication within organizations.

#### 140. Mass Communication and the Public (4) III.

Alcalay

Lecture—4 hours. Current issues in mass communications policy, with emphasis on the broadcast media. Examination of the economic and legal influences on media performance; the role of public broadcasting; the social impact of technological advances, including cable television and communication satellites.

#### 141. Mass Communication Theory and Research (4) I.

Alcalay

Lecture—4 hours. Prerequisite: course 115, or the equivalent course in social science research methods. Recent developments in the study of mass communications content and effects, with emphasis on the broadcast media. Special attention to the function of television for selected audiences; children, minorities, the aged.

#### 142A. News Policies and Practices in Television (2) III.

The Staff (Chairperson in charge)

Lecture—2 hours. Prerequisite: course 140 or 141, or consent of instructor. Processes and constraints in gathering, editing and reporting the news in the broadcast media, as examined by a practicing professional.

#### \*142B. News Policies and Practices in the Press (2)

Lecture—2 hours. Prerequisite: course 140 or 141, or consent of instructor. Processes and constraints in gathering, editing, and reporting the news in the print media, as examined by a practicing professional.

#### \*143. Media Criticism: Broadcast (4)

Lecture—1 hour; discussion—3 hours; one or two major writing assignments. Analysis, interpretation and evaluation of broadcast media content, employing various critical frameworks including genre studies, mythological and dramaturgical criticism, linguistic analysis, iconographic criticism, and theories of popular culture.

#### 151. Methods of Advocacy (4) I.

Pomeroy  
Lecture—4 hours. Prerequisite: course 51 or consent of instructor. Study and practice of methods involved in the effective advocacy of positions on current controversial issues. Relation of inquiry and explanation to advocacy. Consideration of logical and nonlogical means of persuasion.

#### 152. Persuasion (4) II, III.

Bell  
Lecture—4 hours. Prerequisite: course 114 or 115 recommended. Theory and research on the effectiveness of various communicative techniques used to influence the perceptions and behaviors of others. Focuses on scientific research into the processes of persuasion and resistance to persuasion in various contexts. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Sociology 2 or 3.

#### \*180. Current Topics in Rhetoric (4) II, III.

The Staff  
Seminar—4 hours. Prerequisite: upper division

standing with a major in Rhetoric and Communication or consent of instructor. Group study of a special topic in Rhetoric and Communication. May be repeated once for credit. Enrollment limited.

**192. Internship in Rhetoric and Communication**

(1-6) I, II, III. The Staff

Internship—3-18 hours. Prerequisite: declared major in Rhetoric and Communication and 20 units of upper division Rhetoric and Communication courses. Work-research projects, usually at off-campus sites under departmental supervision. May be repeated for credit up to 12 units. Units do not count toward major requirement. (P/NP grading only.)

**194H. Senior Honors Thesis** (4) I, II, III. The Staff

(Chairperson in charge)

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.

**197T. Tutoring in Rhetoric and Communication** (2-4) I, II, III. The Staff (Chairperson in charge)

Seminar—1-2 hours; laboratory—1-2 hours. Prerequisite: upper division standing with major in Rhetoric and Communication and consent of Department Chairperson. Tutoring in undergraduate Rhetoric and Communication courses, including leadership in small voluntary discussion groups affiliated with departmental courses. May be repeated for credit up to six units. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates**

(1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

**Graduate Courses**

Seniors may take graduate courses with consent of instructor.

**210. Contemporary Rhetorical Theory** (4) II. Abbott

Lecture—4 hours. Prerequisite: upper division course in rhetorical theory/criticism or the equivalent. Rhetorical thought in the twentieth century. Processes of rhetorical invention, arrangement, style, and delivery in the works of Kenneth Burke, I.A. Richards, Richard Weaver, Chaim Perelman, and Stephen Toulmin.

**212. Perspectives on Rhetorical and Communication Theory** (4) I. Blair

Seminar—4 hours. Prerequisite: graduate standing in Rhetoric and Communication. Nature and role of paradigms and theories in developing knowledge about communication. Examination of current theoretical perspectives in rhetoric and communication.

**\*214. Mass Communication Theory and Research**

(4)

Seminar—4 hours. Prerequisite: course 220 or the equivalent. Examines the basic theories, models, and assumptions of mass communication. Reviews the current state of this discipline and major research developments. Special emphasis on research regarding media and violence, women and minorities, political communication, and new technologies.

**215. Mass Communication and Social Change** (4) III. Alcalay

Seminar—4 hour. Prerequisite: course 220 and 214, or the equivalent. To gain an understanding of current theories and concepts in persuasion and mass communication. To explore how principles of persuasion are used in communication campaigns. To acquire skills in the planning, implementation, and evaluation of campaigns. Offered in odd-numbered years.

**220. Empirical Methods in Communication** (4) II. Motley

Lecture—4 hours. Prerequisite: course 115 or consent of instructor. Introduction to the use of experimental and descriptive research methods in communication research. Topics include survey research, interviewing, experimental and quasi-experimental design, and statistics.

**\*222. Practicum in Rhetorical Criticism** (4)

Seminar—4 hours. Prerequisite: course 120, an equivalent course in criticism, or consent of instructor. Analysis of selected persuasive messages. Particular attention to the rhetorical situation and to elements in the rhetorical process.

**240. Advocacy in Contemporary Society** (4) III. Pomeroy

Seminar—4 hours. Prerequisite: course 151 or the equivalent. Rhetorical and communication theories of argumentation and advocacy stance. Analysis of the persuasive impact of argumentation occurring in current public controversies. Offered in even-numbered years.

**\*242. Proseminar in Symbolic Behavior** (4)

Seminar—4 hours. Prerequisite: course 220. Examination of language and/or other symbolic codes in communication. Investigated phenomena may include stylistic variation, speech acts, cognitive processing, communication rules, and audience effects. Offered in even-numbered years.

**243. Persuasion Theory** (4) III. Campbell

Lecture-seminar—4 hours. Prerequisite: course 152, 212, or consent of instructor. Major scientific theories of persuasion. Research programs related to persuasion theories.

**\*244. Organizational Communication** (4)

Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Theory and research on communication processes in organizations.

**245. Classical Rhetorical Theory** (4) I. Murphy

Lecture-seminar—4 hours. Prerequisite: course 110 or the equivalent. Recurrent issues in Greek and Roman rhetorical theory, particularly those in the works of Plato, Aristotle, Cicero, and Quintilian. Special attention to problems of invention and style. Frequent seminar reports involving propositions derived from readings.

**246. Perspectives on Relational Communication**

(4) III. Baxter

Seminar—4 hours. Prerequisite: course 212. Critical survey of the current state of inquiry on communication in personal relationships, i.e., friendship, romantic, and marital relationships. Issues examined include the role of communication in constructing, maintaining, and dissolving relationships.

**\*247. Theories of Rhetorical Criticism** (4)

Discussion-seminar—4 hours. Prerequisite: one course in rhetorical theory and/or criticism. Historical evolution of critical standards from the pre-Socratics to the twentieth century. Emphasis on contemporary questions of textuality, objectivity, intentionality, and justification.

**\*248. Media Criticism** (4)

Seminar—4 hours. Prerequisite: a course in criticism. Examines broadcast, print, and visual media by means of rhetorical, psychological, semiological, sociological, and cultural studies and perspectives. Comparison of media and of critical theory scope in understanding media messages. Offered in odd-numbered years.

**249. Interpersonal Communication Theory** (4) I. Baxter

Lecture-seminar—4 hours. Prerequisite: course 134, 212, or consent of instructor. Major theories of interpersonal communication and related research.

**250. Special Topics in Rhetoric** (4) II, III.

Discussion-seminar—4 hours. Selected topics in rhetoric and communication. May be repeated for credit when a different topic is studied.

**\*251. Special Topics in Interpersonal Communication** (4)

Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Selected topics in interpersonal communication. May be repeated for credit when topic changes.

**\*252. Special Topics in Mass Communication** (4)

Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Selected topics in mass communication theory and research. May be repeated for credit when topic changes.

**253. Negotiation** (4) I. Vohs

Seminar—4 hours. Prerequisite: graduate standing and consent of instructor. Theory and research on negotiating. Offered in even-numbered years.

**255. Medieval and Renaissance Rhetorical Theory**

(4) III. Murphy

Seminar—4 hours. Prerequisite: course in ancient Greek and Roman rhetoric. Rhetorical theory from time of Saint Augustine (A.D. 430) to end of Renaissance (A.D. 1700). Three medieval rhetorical genres. Rise of universities. Effect of Renaissance humanism, printing, and science. Influence of major theorists such as Erasmus, Melanchthon, Ramus, and Bacon.

**\*256. Early Modern Rhetorical Theory** (4)

Seminar—4 hours. Prerequisite: course in Classical or Renaissance rhetoric. Development of English and continental theories of rhetoric, 1700-1900. Emphasis upon the works of Priestley, Reid, Campbell, Blair, and Whately. Special attention to psychological, epistemological, and belletristic elements. Offered in odd-numbered years.

**260. Communication Applications** (2-4) I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour; supervised field work—3-9 hours. Prerequisite: course 220. Field work in communication. Organization and implementation of a research project for a specific application of a communication program. May be repeated once for credit. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Lecture—3 hours.

**299. Individual Study** (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

**299R. Thesis Research** (1-12) I, II, III. The Staff (Chairperson in charge)

Independent study—3-36 hours. Prerequisite: graduate standing in Rhetoric and Communication. (S/U grading only.)

**Professional Course**

**390. Teaching Communication Skills at the College Level** (4) I. Motley

Lecture—2 hours; discussion—1 hour; laboratory—4 hours. Prerequisite: graduate standing or consent of instructor. Problems and techniques of teaching basic communication skills courses at the college level. (S/U grading only.)

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**Russian**

(College of Letters and Science)

Lawrence J. Grant, M.A., Program Director  
Program Office, 422 Sproul Hall (916-752-4171)

**Committee in Charge**

Robert O. Crummey, Ph.D. (*History*)

James Gallant, Ph.D. (*Russian*)

Lawrence J. Grant, M.A. (*Russian*)

Harriet Murav, Ph.D. (*Russian*)

Daniel Rancour-Laferrière, Ph.D. (*Russian*)

**Faculty**

Frederick Choate, Ph.D., Visiting Lecturer

Yuri Druzhnikov, Ph.D., Visiting Lecturer

James Gallant, Ph.D., Associate Professor

Lawrence J. Grant, M.A., Lecturer

Harriet Murav, Ph.D., Assistant Professor

Daniel Rancour-Laferrière, Ph.D., Professor

**The Major Program**

The department offers a major in which students may elect to complete one of three emphases, depending upon career interests. The common basis for the first two is extensive training in the Russian language. The *Russian Literature* emphasis concentrates on the evaluation of Russian literary movements and cultural trends. This program prepares students for

graduate study in literature and a career in teaching. The second area of study, the *Russian Language* emphasis, focuses on linguistics and practical language skills. This program prepares students for graduate work and, in conjunction with a secondary field of study in the social or natural sciences, can lead to a career in government or business. The third area, the *Russian Area Studies* emphasis, proposes an interdisciplinary program offering training in the Russian language and literature and in the historical development and contemporary social, political, and economic conditions of the Soviet Union. It is particularly suitable for graduate work in international relations and for careers in diplomacy and in international organizations.

## A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b>	<b>0-38</b>
<b>Literature/Language</b> emphasis	
Russian 1 through 6 (or the equivalent)	0-30
Russian 41, 42	8
Recommended, Linguistics 1.	
<b>Area Studies</b> emphasis	
Russian 1 through 6 or the equivalent	0-30
Russian 41 or 42 or the equivalent course in basic literary analysis	4
<b>Depth Subject Matter</b>	<b>36-44</b>
<b>Russian Literature</b> emphasis	
Russian 101A, 101B, 101C	12
Russian 102 or 103 or 105	4
Russian 121, 123	8
Russian 127 or 128	4
Additional upper division units chosen in consultation with adviser	8
<b>Russian Language</b> emphasis	
Russian 101A, 101B, 101C	12
Russian 102 or 105	4
Russian 103 or 104	4
Russian 160	4
Additional upper division units chosen in consultation with adviser	12
<b>Russian Area Studies</b> emphasis	
Russian 105	4
Russian 101A, 103, or 104	4
Russian 150	4
Three literature courses to be chosen from Russian 121, 123, 126, 128, 140, 141	12
History 137B, 137C	8
Three courses, with no more than two in one area, to be chosen from the following two areas: (a) History 137A, 138, 102F; (b) Social sciences—Political Science 136, Economics 117, Geography 124	12
(To meet special interest course needs, a student should obtain written approval from an adviser.)	
<b>Total Units for the Major</b>	<b>44-78</b>

**Major Adviser.** L.J. Grant.

**Honors and Honors Program.** The honors program comprises at least one quarter of study under course 194H, which will include a research paper. See also the University and College requirements.

## Minor Program Requirements:

Two minor programs are available to students interested in obtaining a solid background in Russian language or literature. The Literature minor does not require a knowledge of the Russian language. Individual minor programs may be designed in consultation with the undergraduate adviser.

	UNITS
<b>Russian</b>	<b>20</b>
<b>Russian Language</b> emphasis	20
Russian 6	4
Russian 101A, 101B, 101C	12

One course from Russian 102, 103, 104, 105, 160	4
<b>Russian Literature</b> emphasis	<b>20</b>
Russian 41 or 42	4
Russian 121, 123; and 140 or 141	12
One course from Russian 120, 126, 150, 154	4
<b>Russian Area Studies</b> emphasis	<b>20</b>
Three courses to be chosen from Russian 121, 123, 126, 150, 154 (Russian 41 or 42 or the equivalent course in basic literary analysis required)	12
One course from History 137B, 137C	4
One course from Political Science 136, Economics 117, Geography 124	4

**Teaching Credential Subject Representative.** J. Gallant. See also under Teacher Education Program.

**Graduate Study.** The Department offers two programs of study (one with emphasis on language and culture, the other with emphasis on literature) leading to the M.A. degree. Detailed information may be obtained by writing to the Graduate Adviser.

**Graduate Adviser.** F. Choate.

## Courses in Russian

### Lower Division Courses

**Course Placement.** 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) I, II. Grant in charge  
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.)

**2. Elementary Russian** (5) II, III. Grant in charge  
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of grammar and language skills developed in course 1.

**3. Elementary Russian** (5) I, III. Grant in charge  
Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Continuation of grammar and language skills developed in course 2.

**4. Intermediate Russian** (4) I. Grant and staff  
Discussion—4 hours; laboratory—1 hour. Prerequisite: course 3. Grammar review and conversational practice.

**5. Intermediate Russian** (4) II. Grant and staff  
Discussion—4 hours; laboratory—1 hour. Prerequisite: course 4. Grammar review. Introduction to literature. Conversational practice.

**6. Intermediate Russian** (4) III. Grant and staff  
Discussion—4 hours; laboratory—1 hour. Prerequisite: course 5. Grammar review. Intermediate conversation and continued reading of literature.

**10. Elementary Conversation** (2) I, II, III. The Staff  
Discussion—2 hours. Prerequisite: course 1; course 2 or 3 (concurrently). Conversational practice to improve pronunciation and master spoken idioms. May be repeated for credit up to a maximum of 6 units.

**\*30. Great Russian Writers (in English)** (4) III.

Grant  
Lecture—3 hours; written reports. Introduction to the important prose and dramatic works of such writers as Gogol, Turgenev, Dostoevsky, Tolstoy, Chekhov, Sholokhov, and Pasternak.

**41. Survey of Nineteenth-Century Russian Literature (in English)** (4) I. Murav

Lecture—3 hours. Introduction to dominant literary trends, major literary figures and landmarks of Russian prose and poetry from the period of Sentimentalism through Romanticism and Realism to the beginnings of Modernism. Offered in even-numbered years.

### 42. Survey of Twentieth-Century Russian Literature (in English)

(4) II. Rancour-Laferriere  
Lecture—3 hours. Introduction to major literary trends such as Symbolism, Acmeism, Futurism, Neorealism, and Socialist Realism. Readings from representative writers such as Gorky, Bely, Pasternak, Solzhenitsyn, and Tertz.

**44. Children's Literature in Russia** (4) III. Druzhnikov  
Lecture—3 hours; term paper. Knowledge of Russian not required. History and theory of children's literature, with special reference to Russian and Soviet examples. Analysis of genres, technique, and folklore elements, contrasted with those of the West. Students will write their own literature for children. General Education credit: Civilization and Culture/Introductory.

**98. Directed Group Study** (1-5) I, II, III. The Staff  
Discussion—1-5 hours. (P/NP grading only.)

**99. Special Study for Undergraduates** (1-5) I, II, III.  
The Staff (Chairperson in charge)  
(P/NP grading only.)

### Upper Division Courses

**101A. Advanced Russian** (4) I. Gallant

Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: course 6. Topics in Russian grammar for the advanced student. Reading and discussion of contemporary literary and journalistic texts. Conversation exercises utilizing literary and colloquial variants of current Soviet speech.

**101B. Advanced Russian** (4) II. The Staff

Lecture—2 hours; discussion—1 hour; oral reports. Prerequisite: course 101A. Topics in Russian grammar for the advanced student. Reading and discussion of contemporary literary and journalistic texts. Conversation exercises utilizing literary and colloquial variants of current Soviet speech.

**101C. Advanced Russian** (4) III. The Staff

Lecture—2 hours; discussion—1 hour; oral reports. Continuation of course 101B. Topics in Russian grammar for the advanced student. Reading and discussion of contemporary literary and journalistic texts. Conversation exercises utilizing literary and colloquial variants of current Soviet speech.

**102. Russian Composition** (4) II. The Staff

Discussion—3 hours; individual tutorial with instructor. Prerequisite: course 6. Practice in writing Russian. One composition on a different topic each week. Topics include: history, geography, politics, and literature of Russia; comparison of Soviet and American lifestyles; current events. Conducted in Russian. Offered in odd-numbered years.

**\*103. Literary Translation** (4) III. Murav

Discussion—3 hours. Prerequisite: course 101C. Translation of Russian literary texts into stylistically equivalent idiomatic English. Offered in even-numbered years.

**104. Scientific Translation** (4) III. Rancour-Laferriere

Discussion—3 hours; individual translation projects—1 hour. Prerequisite: course 101A. Techniques of translating Russian scientific texts. Science students will select articles from their fields of interest; Russian students will work on materials assigned by instructor. Offered in odd-numbered years.

**105. Advanced Russian Conversation** (4) II. The Staff

Conversation—3 hours; preparation of texts—1 hour. Prerequisite: course 6. Intensive conversational practice and discussion based on current events and contemporary texts. Offered in even-numbered years.

**\*120. Medieval Literature and Eighteenth-Century Classicism (in English)** (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Survey of medieval epics, chronicles, and tales; of the early development of prose and of Baroque literature. Also Classicism and Sentimentalism will be studied. Offered in even-numbered years.

**121. Nineteenth-Century Russian Prose (in English)** (4) II. Rancour-Laferriere

Lecture—3 hours; term paper. Development of prose from Pushkin and Gogol, through Dostoevsky and Tolstoy, to Maxim Gorky. Other writers are selected sequentially: Turgenev, Goncharov, Pisemsky,

Saltykov, Chekhov. Romanticism, the Natural School, critical realism, and psychological realism are covered. Offered in odd-numbered years.

**\*123. Twentieth-Century Russian Prose (In English) (4) II. Murav**

Lecture—3 hours; term paper. Examination of various trends including Acmeism, Symbolism, Neorealism, and Socialist Realism in development of prose. Readings from such writers as Gorky, Zamiatin, Sholokhov, Pasternak, and Solzhenitsyn. Offered in even-numbered years.

**126. The Russian Theater (in English) (4) III. Murav**

Lecture—3 hours; discussion—1 hour. The main works of Russian dramatists from Gogol to the present, including Turgenev, Tolstoy, Chekhov, Gorky, Mayakovsky, Bulgakov, Shvarts. Offered in odd-numbered years.

**127. Nineteenth-Century Russian Poetry (4) I.**

Rancour-Laferriere

Discussion—3 hours; term paper. Prerequisite: course 6. Introduction to the principles of Russian versification followed by historical and poetic analysis of the following figures: Derzhavin, Zhukovsky, Pushkin, Delvig, Baratynsky, Lermontov, Nekrasov, Tjutchev, and Fet. Conducted in Russian. Offered in odd-numbered years.

**128. Twentieth-Century Russian Poetry (4) I. Rancour-Laferriere**

Discussion—3 hours; term paper. Prerequisite: course 6. Introduction to principles of Russian versification followed by historical and poetic analysis of the following figures: Brjusov, Blok, Akhmatova, Mandelstam, Esenin, Mayakovsky, Khlebnikov, Pasternak, Evtushenko, Voznesensky, and Brodsky. Conducted in Russian. Offered in even-numbered years.

**130. Contemporary Soviet Culture (4) III. Choate**

Lecture—3 hours; written work. Prerequisite: upper division standing or consent of instructor. Knowledge of Russian not required. Investigation of current trends in Soviet culture and the intricate relationship between artists and the government. Topics include: history of censorship, official and dissident art, recent changes in the cultural scene. Offered in even-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**131. Literature of Revolution (4) II. Murav**

Lecture—3 hours; essays. Prerequisite: History 3 or 4C, and/or any introductory literature course. Study of impact of revolution on society and culture; the major artistic, political and historical works surrounding the Russian revolutions of 1905 and 1917. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List, or History 3 or 4C. Offered in odd-numbered years.

**132. Nature and Culture in the Soviet Union (4) I.**

Choate

Lecture—3 hours; discussion—1 hour. Prerequisite: any introductory course in environmental studies. Presents a history of the Soviet environmental movement from the 1920s to the present, showing the influence of Stalinism on environmental ethics; concepts of society and nature in Soviet literature and film; and international implications of Soviet environmental policy. No knowledge of Russian required. General Education credit: Contemporary Societies/ Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**140. Dostoevsky (In English) (4) I. The Staff**

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. Offered in even-numbered years.

**\*141. Tolstoy (In English) (4) I. The Staff**

Lecture—3 hours. 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. Offered in odd-numbered years.

**150. Russian Culture (4) III. The Staff**

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. Offered in odd-numbered years.

**151. Soviet Writers and Censorship (4) II.**

Druzhnikov

Lecture—3 hours; discussion—1 hour. Prerequisite: any introductory course from the GE Literature Preparation List or consent of instructor. Literature and censorship in the Soviet Union. Personal responsibility of the author vs. conformism to state morality. Soviet myths and Soviet realities. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: any course from the GE Literature Preparation List.

**154. Russian Folklore (4) III. Rancour-Laferriere**

Lecture—3 hours; term paper. Knowledge of Russian not required. Russian folklore, rituals, and history will be analyzed and compared with folklore of other peoples. Sociological implications of attitudes toward family unit, children, etc. Influences of folklore on Russian literature and historiography. Offered in even-numbered years.

**160. Russian Phonology and Morphology (4) II.**

Gallant

Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 101A, 101B, or consent of instructor. Linguistic analysis of the Russian sound system and of Russian word-formation. Offered in odd-numbered years.

**166. Representations of Sexuality in Russian Literature (4) I. Rancour-Laferriere**

Lecture—3 hours; term paper. Prerequisite: Women's Studies 50 or introductory psychology. Sexuality in Russian oral and written literature from a dual, feminist-psychoanalytic perspective. Monogamy, free love, sexism, homosexuality, incest, androgyny, and others as depicted by such writers as Pushkin, Gogol, Tolstoy, Dostoevsky, Akhmatova, Blok, Tolstaya, and others. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Women's Studies 50 or introductory psychology.

**192. Research Essay (2) I, II, III. The Staff**

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.

**194H. Special Study for Honors Students (5) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: open only to honors students. Guided research leading to an honors paper.

**198. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Chairperson in charge)**

(P/NP grading only.)

**Graduate Courses**

**\*200. Old Church Slavic (4) I. Gallant**

Lecture—3 hours; reading projects. A synchronic and diachronic analysis of Old Church Slavic. Offered in odd-numbered years.

**\*202. History of the Russian Language (4) II. The Staff**

Seminar—3 hours; individual reading projects—1 hour. Prerequisite: course 200 or consent of instructor. Survey of Russian historical grammar and development of Russian literary language. Reading in the original texts from eleventh to eighteenth century. Offered in odd-numbered years.

**\*204. Descriptive Russian Grammar (4) III. The Staff**

Lecture—3 hours; reading projects—1 hour. Introduction to modern Russian phonology and morphology. Offered in even-numbered years.

**\*210A. Style and Syntax (4) I. Turnins**

Discussion—3 hours; reading projects—1 hour. Examination of stylistic differences between spoken and written Russian.

**\*210B. Style and Syntax (4) II. The Staff**

Discussion—3 hours; reading projects—1 hour. Prerequisite: course 210A or consent of instructor. Examination of stylistic differences between spoken and written Russian.

**\*210C. Russian Style and Syntax (4) III. The Staff**

Discussion—3 hours; term paper. Prerequisite: course 210B or consent of instructor. Students present formal papers and talks on political, economic, social, and cultural topics, lead and participate in discussions. Conducted in Russian.

**\*220. Old Russian Literature (4) II. The Staff**

Seminar—3 hours. Advanced study of intellectual movements and literary styles of works such as *The Song of Igor's Campaign*, *Zadonshchina*, Epifany's Lives, Ivan IV's cycle of epistles. May be repeated for credit when different topics are studied. Offered in even-numbered years.

**\*221. Eighteenth-Century Russian Literature (4) II. The Staff**

Seminar—3 hours. Advanced study of literary movements and styles in prose or poetry. The works of writers such as Kantemir, Lomonosov, Sumarokov, Radishchev and Karamzin will be analyzed. May be repeated for credit when different topics are studied. Offered in odd-numbered years.

**\*222. Nineteenth-Century Russian Literature (4) I. Rancour-Laferriere**

Seminar—3 hours. Advanced study of the works of one or several writers or movements of the period. May be repeated for credit with consent of instructor when different topics are studied. Offered in odd-numbered years.

**\*223. Early Twentieth-Century Russian Literature (4) I. Rancour-Laferriere**

Seminar—3 hours. Advanced study of one or more of the modernist movements in Russian literature, including Symbolism, Acmeism, and Futurism. May be repeated for credit when different topics studied. Offered in even-numbered years.

**\*224. Soviet Russian Literature (4) III. Rancour-Laferriere**

Seminar—3 hours. Analysis of selected works of Russian prose and poetry with particular emphasis on works of extraordinary literary merit or of unusual importance in the development of genres, schools, styles, techniques, and various formal elements. May be repeated for credit when different topics are studied. Offered in odd-numbered years.

**298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

**299. Research (1-12) I, II, III. The Staff (Chairperson in charge)**

(S/U grading only.)

**Professional Course**

**\*300. The Teaching of Russian (2) I. Grant**

Discussion—2 hours. Prerequisite: graduate standing or consent of instructor. Workshop in language teaching methods. Students audit classes in progress and teach under faculty supervision. Required of new and prospective teaching assistants.

## Scandinavian

(College of Letters and Science)

Department Office (German and Russian), 416  
Sprout Hall (916-752-2114)

### Faculty

Fritz Sammern-Frankenegg, Ph.D., Lecturer  
(*Swedish, German*)

## Courses in Scandinavian

### Upper Division Courses

#### 110. Masterworks of Scandinavian Literature in Translation (4) I. Sammern-Frankenegg

Lecture—3 hours; written reports. Readings in English translation from Icelandic Saga to the present, treating such major authors as Ludvig Holberg, Søren Kierkegaard, Henrik Ibsen, Sigrid Undset, August Strindberg, Selma Lagerlöf, Pär Lagerkvist. Content varies from year to year. May be repeated twice for credit.

#### 111. Swedish Film as Narrative (4) III. Sammern-Frankenegg

Lecture—3 hours; term paper. Swedish films studied as narratives in the cinematic medium and compared to their literary sources. Offered in even-numbered years.

## Courses in Swedish

### Lower Division Courses

#### 1. Elementary Swedish (5) I. Sammern-Frankenegg

Discussion—5 hours. Introduction to Swedish grammar and development of all language skills in a cultural context with special emphasis on communication. (Students who have successfully completed Swedish 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.)

#### 2. Elementary Swedish (5) II. Sammern-Frankenegg

Discussion—5 hours. Prerequisite: course 1. Continuation of course 1 in the areas of grammar and basic language skills.

#### 3. Intermediate Swedish (5) III. Sammern-Frankenegg

Discussion—5 hours. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills through cultural texts.

#### \*4. Intermediate Swedish (4) I. Sammern-Frankenegg

Discussion—3 hours; weekly reports. Prerequisite: course 3. Review of grammatical principles by means of written exercises. Reading and discussion of modern Swedish literary and nonliterary texts.

#### \*6A. Spoken Swedish (2) I. Sammern-Frankenegg

Discussion—2 hours. Prerequisite: course 2. Conversational practice based on everyday vocabulary of modern spoken Swedish. (P/NP grading only.)

#### \*6B. Spoken Swedish (2) II. Sammern-Frankenegg

Discussion—2 hours. Prerequisite: course 2. Conversational practice based on everyday vocabulary of modern spoken Swedish. (P/NP grading only.)

#### 98. Directed Group Study (1-3) I, II, III. Sammern-Frankenegg

Prerequisite: consent of instructor. (P/NP grading only.)

#### 99. Special Study for Undergraduates (1-3) I, II, III. Sammern-Frankenegg

Prerequisite: consent of instructor. (P/NP grading only.)

## Sociology

(College of Letters and Science)

Lawrence E. Cohen, Ph.D., Chairperson of the Department

Department Office, 113 Young Hall (916-752-0782)  
Advising Office, 139 Young Hall (916-752-0786)

### Faculty

Nicole W. Biggart, Ph.D., Associate Professor  
(*Sociology, Management*)

Fred Block, Ph.D., Professor

Lawrence E. Cohen, Ph.D., Professor

James C. Cramer, Ph.D., Associate Professor

Diane H. Felmlee, Ph.D., Associate Professor

Jack A. Goldstone, Ph.D., Professor

Bruce M. Hackett, Ph.D., Associate Professor

John R. Hall, Ph.D., Professor

Gary G. Hamilton, Ph.D., Professor

Mary Jackman, Ph.D., Professor (*Political Science, Sociology*)

Carole E. Joffee, Ph.D., Professor

Carl C. Jorgensen, Ph.D., Associate Professor

Edwin M. Lemert, Ph.D., Professor Emeritus

John F. Lofland, Ph.D., Professor

Lyn H. Lofland, Ph.D., Professor

Leon H. Mayhew, Ph.D., Professor

Dario Melossi, Ph.D., Associate Professor

Beatriz M. Pesquera, Ph.D., Assistant Professor

(*Chicano Studies, Sociology*)

Belinda Robnett, Ph.D., Assistant Professor

Julius A. Roth, Ph.D., Professor

John F. Scott, Ph.D., Professor

Judith Stacey, Ph.D., Professor

John T. Walton, Ph.D., Professor (*Anthropology, Sociology*)

Diane L. Wolf, Ph.D., Assistant Professor

## 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 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 Department of Sociology offers two major programs, Sociology and Sociology—Organizational Studies.

Students selecting the Sociology major may choose one from four options offered within this major: the General emphasis, the Law and Society emphasis, the Social Services emphasis, and the Comparative Studies and World Development emphasis. The General Sociology emphasis allows students to obtain a broad understanding of the concepts, methods, and theories of sociology. This option is designed for students desiring a solid liberal arts education as well as those interested in graduate work in the social sciences. 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. These options are designed to prepare students for careers in such areas as law, corrections, social work or counseling. 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 "underdeveloped" societies. It can prepare students for graduate training leading to careers in international fields. Students are encouraged to consider the Education Abroad Program for their junior year, especially one in a developing country.

The Sociology—Organizational Studies major is designed to develop 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. Majors in Sociology—Organizational Studies will be prepared for a variety of career options, particularly in the field of management. The major has been specifically designed to meet entry requirements for programs of professional training leading to a Masters degree in public or private management, and may also lead to further study in any of the disciplinary areas incorporated in the major.

In addition to the above majors and options, the Department of Sociology offers several other programs and opportunities for undergraduates. These include an honors program, tutorships, voluntary research assistantships, internships, and membership in the Undergraduate Sociology Student Association and in the International Sociology Honors Society. The department also sponsors an undergraduate research award.

The Department of Sociology sponsors the interdisciplinary minor in War-Peace Studies. Composed of courses from several departments, it is not a minor in Sociology and is entered in transcripts as "War-Peace Studies." For requirements and other details see War-Peace Studies.

For more information on the majors and special programs, contact the Departmental Advising Office in 139 Young Hall.

### Sociology

#### A.B. Degree Requirements:

##### General emphasis:

	UNITS
<b>Preparatory Subject Matter</b>	<b>24-25</b>
Sociology 1, 2, or 3; 46A, 46B (or the equivalent)	12-13

Select units from Anthropology 2, 4 ..... 4

Select units from History 3, 4A, 4B, 4C, 8, 9A, 9B, 10, 15, 17A, 17B ..... 4

Select units from Philosophy 1, 5, 14, Political Science 4 ..... 4

	44
<b>Depth Subject Matter</b>	
Sociology 126, 140, 165A, 165B, 170, 180A	24

Select two courses each from **two** of the following seven clusters and one additional course from a third cluster ..... 20

Family, Gender, and Social Interaction  
Sociology 122, 127, 131, 132, 143B

Law and Social Services  
Sociology 120, 150, 152, 154, 155, 158, 185

Social Conflict and Change  
Sociology 102, 123, 141, 142, 143A, 145, 147, 148, 156, 157, 180B, 181, 182

Race and Ethnicity  
Sociology 110, 128, 129, 130, 134, 169

Power and Politics  
Sociology 118, 119, 133, 139, 144, 159

Knowledge and Communication  
Sociology 124, 125, 146, 173, 175, 176

Methodology  
Sociology 103, 106, 169, 192

Total Units for the Major	68-69
(General emphasis)	

**Recommended:** Sociology 189

##### Law and Society option:

	UNITS
<b>Preparatory Subject Matter</b>	<b>25-27</b>
Sociology 1, 3, 46A, 46B (or the equivalent)	17

Select units from Anthropology 1, 2, Economics 1A, 1B, History 3, 4B, 4C, 17A, 17B, Philosophy 1, 12, 21, 22, 23, Political Science 1, 2, 3, 4, Psychology 1, 15 ..... 8-10

	40
<b>Depth Subject Matter</b>	
Sociology 155	4

Select units from Sociology 120, 150,



- 98. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. Primarily intended for lower division students. (P/NP grading only.)
- 99. Special Study for Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

- \*102. Sociology of the Environment (4) Cramer**  
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 3; upper division standing or consent of instructor; course 140 or 156 recommended. Sociological analysis of environmental problems in advanced industrial societies; types of problems and their causes; population growth and affluence; social class, life styles, and the environmental movement; impacts of environmental changes on social institutions and structures, e.g., family, economy, stratification.
- 103. Evaluation Research Methods (4) II.** The Staff  
Lecture—3 hours; discussion—1 hour or field research (decided by instructor each time course offered). Prerequisite: course 46A and 46B, or Statistics 13 or the equivalent. 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.

- 106. Intermediate Social Statistics (4) I.** Cramer; III. The Staff  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 46B or Statistics 13 or the equivalent. 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.

- 107. Seminar in Sociological Analysis (4) I.** Jorgensen  
Seminar—3 hours; to be arranged—1 hour. Research and analysis using basic concepts of sociology, social organization, culture, socialization, stratification in application to specific problems. May be repeated for credit with consent of instructor. Limited enrollment.

- 110. Sociology of Chicano Culture (4) II.** Pesquera  
Lecture—3 hours; term paper. The Chicano experience in the American society and economy viewed from theoretical perspectives. Immigration, history of integration of Chicano labor into American class structure, education inequality, ethnicity, the family, and Chicano politics. Offered in even-numbered years.

- 118. Political Sociology (4) I.** Jackman  
Lecture—3 hours; discussion—1 hour or term paper or research project. 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.

- 119. War-Peace Institutions (4) II.** J. Lofland  
Lecture—3 hours; discussion—1 hour or term paper or project. Comparative analysis of institutions and organizations involved in issues of international war and peace; focus on American institutions, including, on the one side, the Department of Defense and, on the other, major organizations of the peace movement. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 2.

- 120. Deviation and Society (4) I.** Melossi  
Lecture—3 hours; discussion—1 hour or term paper or research project. Theory and studies of deviation in relation to societal reaction, group processes and social roles. Stigma and incapacity; cosmetic defect. Deviation theory applied to selected crimes, prostitution, drugs, alcohol use, and mental disorders. Creativity and society.

- 122. Sociology of Adolescence (4) I, II.** Scott  
Lecture—3 hours; discussion—1 hour or term paper

or research project. 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.

- 123. American Society (4) I, II.** Scott  
Lecture—3 hours; discussion—1 hour or term paper or research 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.

- 124. Sociology of Education (4) III.** Scott  
Lecture—3 hours; term paper or discussion—1 hour (instructor's option). Education and the social structure. Class size, curriculum, and economies of scale. Relations between families and schools in socialization; familial ascription and educational achievement. Education and industrialization. Organizational and occupational structure of schools. Discussion of selected controversies.

- \*125. Sociology of Intellectual Life (4) The Staff**  
Lecture—4 hours. Sociological analysis of the intelligentsia; types of intellectuals, theories concerning their social role; research on the social sources of intellectual work in politics, literature, art and science; historical considerations of intellectual milieu; international comparisons of intellectuals.

- 126. Social Interaction (4) III.** Robnett  
Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 2. Everyday 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.

- 127. Sociology of Death (4) III.** L. Lofland  
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. Overview of attitudes toward, structural effects of, and methods of coping with, death and death-related behaviors. Particular attention to social psychological aspects of death and dying, to death occupations and to death rituals in various cultures.

- 128. Interracial Interpersonal Dynamics (4) I.** Jorgensen  
Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: one course from courses 1, 2, 3, Afro-American Studies 10, Asian American Studies 1, 2, Chicano Studies 10, Native American Studies 1, 10. 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.

- 129. Sociology of Black Experience in America (4) III.** Robnett  
Lecture—3 hours; discussion, research, or term paper (instructor's option). 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.

- 130. Race Relations (4) III.** Jorgensen  
Lecture—3 hours; discussion—1 hour or term paper or research project. 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.

- 131. The Family (4) II.** Stacey  
Lecture—3 hours; discussion—1 hour. 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.

- 132. The Sociology of Gender (4) I.** Felmlee; II. Robnett

Lecture—3 hours; discussion—1 hour. 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. Offered in odd-numbered years.

- \*133. Sexual Stratification and Politics (4) Stacey**  
Lecture—3 hours; discussion—1 hour. Prerequisite: course 132 or the equivalent or 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.

- 134. Sociology of Racial Ethnic Families (4) III.** Pesquera

Lecture—3 hours; discussion—1 hour or term paper. 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 in odd-numbered years.

- 139. Corporations and Society (4) I.** Block

Lecture—3 hours; research project. The 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.

- 140. Social Stratification (4) III.** Hackett

Lecture—3 hours; discussion—1 hour or term paper or research project (instructor's option). 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.

- 141. Industrialization and Social Change (4)**

Hackett

Lecture—3 hours; discussion—1 hour or term paper or research project. 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.

- \*142. Sociology of Transportation (4) Scott**

Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological factors in transportation. Consequences of transport mode development on social organization, sociological influences in transport mode choice. Transportation issues in public policy.

- \*143A. Urban Society (4) I. L. Lofland**

Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. 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. Offered in even-numbered years.

- \*143B. Sociology of City Life (4) I. L. Lofland**

Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent; course 143A 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. Offered in odd-numbered years.

- \*144. Agriculture and Society (4) Walton, Wolf**

Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: advanced standing in the social sciences or one year of course work in agricultural and environmental sciences. Development of agriculture as a major enterprise in modern society with the concomitant reduction in the labor

force and family farms. Analysis of issues including mechanization, migrant labor, corporate farming, and public resource policy. Offered in even-numbered years.

**145A. Sociology of Third World Development (4) I.**  
Wolf

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; upper division standing. 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.

**145B. Gender and Rural Development in the Third World (4) III.** Wolf

Seminar—4 hours. Prerequisite: course 1; upper division standing. 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 in even-numbered years.

**\*146. Sociology of Religion (4) Hall**

Lecture—3 hours; discussion—1 hour or term paper or research project. 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 in even-numbered years.

**147. Sociological Perspectives on East Asia (4) II.**

Hamilton

Lecture—3 hours; discussion—1 hour or term paper or research project. 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 in odd-numbered years.

**\*148. Collective Behavior (4) The Staff**

Lecture—3 hours; discussion—1 hour or term paper or project (instructor's option). Prerequisite: course 1 or the equivalent. 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.

**149. Religion and American Society (4) III.** Hall

Lecture—3 hours; class project. 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 in even-numbered years.

**150. Criminology (4) I.** Cohen

Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological analysis of criminal behavior in relation to social structure and the criminalization process.

**152. Juvenile Delinquency (4) II.** Cohen

Lecture—3 hours; discussion—1 hour or term paper or research project. 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.

**154. Sociology of Health Care (4) II.** Roth

Lecture—3 hours; discussion—1 hour or term paper or research project. Overview of sociological research in medicine and health care, with emphasis on the organizational, institutional, and social psychological aspects.

**155. Sociology of Law (4) II.** Melossi

Lecture—3 hours; discussion—1 hour or term paper or research project. 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.

**156. Social Movements (4) II.** J. Lofland

Lecture—3 hours; discussion—1 hour or term paper

or project (instructor's option). 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.

**157. Social Conflict (4) III.** J. Lofland

Lecture—3 hours; discussion—1 hour or term paper or project. 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. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Political Science 2 or Sociology 3.

**158. Consumer-Vendor Relationships (4) III.** Roth

Lecture—3 hours; discussion—1 hour. Examine the relationship between consumers and the vendors of goods and services using case materials, student projects, and relevant literature in sociology and related fields. Emphasis will be on organizational structure and bargaining power.

**159. Sociology of Occupations (4) II.** Roth

Lecture—3 hours; discussion—1 hour or term paper or research project. Natural history of occupations; the institutional matrix of occupations; colleague and client relationships; occupational social controls; career lines, and occupational-related self-definitions; occupational politics.

**165A. Sociological Theory (4) I.** Melossi

Lecture—3 hours; discussion—1 hour or term paper or research project. Historical introduction to sociological theory with special reference to its European origins. The development of modern sociological theory in Europe by Durkheim, Weber, Simmel, Pareto, Mosca, and others.

**165B. Sociological Theory (4) II.** Block

Lecture—3 hours; discussion—1 hour or term paper or research project. Contemporary sociological theory with special reference to the history of American sociology and the emergence of contemporary schools of thought in the United States. Schools discussed will include functionalism, symbolic interactionism, exchange theory, and ecology.

**169. Research in the Chicano Community (4) III.**

Pesquera

Lecture—3 hours; research project. Prerequisite: course 46A. Problems of understanding the Mexican-American in various types of social settings; how to conduct social research in such settings. Conceptual and data gathering problems peculiar to this area of study, and developing strategies and skills for overcoming them.

**170. Population (4) I.** Cramer

Lecture—3 hours; discussion—1 hour or term paper or research project. 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.

**\*173. Sociology Through Literature (4)** Walton

Lecture—3 hours; discussion—1 hour or term paper or research project. 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 in odd-numbered years.

**\*175. Sociology of Mass Communication (4) The Staff**

Lecture—3 hours; discussion—1 hour or term paper (instructor's option). Prerequisite: course 1 or the equivalent. Examines the relationship between the media and social structures. History of media-state relations. Media as reflector and shaper of values. Emphasis is on current European, Marxist and pluralist theories rather than content analysis. Offered in even-numbered years.

**\*176. Sociology of Knowledge (4) Hackett**

Lecture—3 hours; discussion—1 hour or term paper or research project. Critical analysis of the social foundations of knowledge in society. The history, problems, and dilemmas in classical sociology of

knowledge. Contemporary applications. Natural and social sciences as social systems. Sociology of personal knowledge in everyday life. Offered in odd-numbered years.

**180A. Complex Organizations (4) II.** Hamilton

Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 1; Economics 1A and 1B 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.

**180B. Complex Organizations (4) III.** Hamilton

Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 180A or 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.

**\*181. Social Change Organizations (4) J.** Lofland

Lecture—3 hours; discussion—1 hour or term paper or project. Prerequisite: upper division standing or completion of course 1. 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.

**\*182. Experimental and Utopian Communities (4)**

III. Hackett

Lecture—3 hours; discussion—1 hour. The social structure of intentional, experimental or Utopian settlements and communitarian movements, including comparison with other small settlement forms: villages, neighborhoods, monasteries, encampments and nonsettlement communities based on occupation, ethnicity, and religion.

**\*183. Comparative Organizations (4) III.** Biggart

Lecture-discussion—3 hours; term paper. Prerequisite: course 180A or 180B; upper division standing. Examination of economic and political organizations of major industrial nations. Discussion of historical, cultural, social, and political influences on industrial patterns and practices, alternative theoretical models for explaining differential development. Societies may include Sweden, Japan, Germany, Taiwan, and South Korea. Offered in even-numbered years.

**185. Sociology of Social Welfare (4) III.** Joffe

Lecture—3 hours; discussion—1 hour or term paper or research project. Sociological analysis of the evolution and current organization of welfare functions in modern societies.

**189. Social Science Writing (4) III.** Jorgensen

Lecture—3 hours; discussion—1 hour or term paper or research project. Prerequisite: course 46A, upper division standing, and 12 units of social science. Improved analytic writing and methods for reporting social science research to a wider public. Sociological analysis of the conditions of good and bad writing.

**192. Internship and Research Practicum (2-12) I, II, III.** The Staff

Internship—3-33 hours; discussion—1 hour. Prerequisite: upper division standing; course 46A; approval of proposed internship. Supervised internship and study in an agency, organization or institution; application of core concepts in sociology to the work experience. May be repeated for credit only by permission. Maximum of 4 units of 192 may be counted toward the Sociology major. (P/NP grading only.)

**194HA-194HB. Special Study for Honors Students (4-4) I, II.** The Staff

Seminar—3 hours; term paper. Prerequisite: senior standing and admission to the Honors Program. Directed reading, research and writing culminating in the preparation of a Senior Honors Thesis under direction of faculty adviser. (Deferred grading only pending completion of course sequence.)

**197T. Tutoring in Sociology (1-4) I, II, III.** The Staff

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) I, II, III.** The Staff (Hamilton in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Hamilton in charge)

Prerequisite: open to seniors only. (P/NP grading only.)

**Graduate Courses**

**207A-207B. Methods of Quantitative Research (4-4) II-III.** Cohen, Felmlee

Lecture—3 hours; 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. (Deferred grading only, pending completion of sequence.)

**215. Economy, Polity, and Society (4) I.** Block

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.

**220. Deviance, Law, and Social Control (4) I.** Cohen

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.

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grading only, pending completion of sequence.) Offered in even-numbered years.

**\*243. Urban Society (4) L.** Lofland

Seminar—3 hours; 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.

**245. Developing Societies (4) III.** Walton

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 in even-numbered years.

**\*248. Social Movements (4) J.** Lofland

Seminar—3 hours; 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.

**254. Sociological Issues in Health Care (4) I.** Roth

Seminar—3 hours; 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. (S/U grading only.)

**\*255. Sociology of Law (4) III.** Melossi

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.

**264. Proseminar in Sociology (4) I.** Stacey

Seminar—4 hours. Prerequisite: limited to first year Sociology graduate students. Introduction to sociological concepts at an advanced level. Subjects include culture, social interaction, stratification, deviance, demography, collective behavior, organizations and other topics in which the department offers further specialized work. Various approaches to sociological analysis are examined.

**265. Sociological Theory (4) II.** Hall

Lecture-discussion—3 hours. Prerequisite: courses 165A, 165B; or consent of instructor. The emergence of sociological thinking as part of the history of ideas; the application of sociological analysis to sociological ideas. The French sociological tradition from Saint-Simon to Durkheim; the influence of Marxist thinking on subsequent sociological ideas.

**\*270. Social Demography (4) Cramer**

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.

**280. Organizations and Institutions (4) III.** Hackett

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.

**290. Seminar (4) I, II, III.** The Staff (Chairperson in charge)

Seminar—3 hours; term paper. (S/U grading only.)

**291. Information and Society: A Practicum in Information Retrieval (2) I.** Winter

Seminar—2 hours. Introduction to core reference and research materials in sociology and related social science fields. Shields Library material will be used, but local orientation is a secondary emphasis. Main emphasis will be on standard works and how researchers can use them. (S/U grading only.)

**\*292A-292B. Field Research (4-4) II-III.** Wolf

Seminar—3 hours; field trips. Prerequisite: graduate standing in Sociology or consent of instructor. The

process of collecting, analyzing and reporting qualitative social data: techniques of intensive interviewing, participant-observation and document analysis; generating, developing, and evaluating analytic frameworks; recording, storing, retrieving, and writing up qualitative data. Emphasis on application of principles; each participant completes a field work project. (Deferred grading only, pending completion of sequence.) Offered in odd-numbered years.

**298. Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (S/U grading only.)

**299. Individual Study (1-12) I, II, III.** The Staff (Chairperson in charge)

(S/U grading only.)

## Soil and Water Science

(College of Agricultural and Environmental Sciences)

### The Major Program

Soil and Water Science is concerned with the use and protection of our land and water resources. The major is designed to provide preparation for advanced degrees in Soil Science or Water Science or for a career involving these resources as well as for a more general interest in resource use and protection. Programs are designed to include land use, soil survey, soil management and conservation, plant nutrition, diagnostic technology, irrigation and drainage, water resources management, water quality, general soil science, and general water science. (For example, the emphasis on water quality would include more than the minimum number of units of physical and biological sciences, while an emphasis in resource allocation and land-use planning would include more courses in the social, political, and economic areas.) The flexibility of this major makes possible a wide variety of career opportunities which includes managerial and technical positions with agri-businesses such as equipment and supply companies, farm management, and positions involving advising, planning, land appraisal, research, and teaching with private, district, county, state, federal, and international organizations dealing with soil and water development, use, and conservation.

### B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses where possible. Equivalent or more comprehensive courses are acceptable. *Courses shown without parentheses are required.*)

	UNITS
<b>Written/Oral Expression</b> .....	<b>11-12</b>
Written expression (see College requirement) .....	7-8
Oral expression (Rhetoric 1) .....	4
<b>Preparatory Subject Matter</b> .....	<b>74</b>
Biological sciences (Biological Sciences 1A, 1B, 1C).....	15
Chemistry (Chemistry 1A-1B-1C and a more advanced course).....	18
Computer science (Agricultural Science and Management 21, Engineering 5) .....	3
Economics or agricultural economics (Economics 1A, 1B).....	5
Geology (Geology 50).....	3
Mathematics (Mathematics 16A, 16B).....	6
Physics (Physics 5A-5B-5C) .....	12
Statistics (Statistics 13, Agricultural Science and Management 150).....	4
Additional physical sciences, biological sciences, and/or mathematics with approval of adviser .....	8

<b>Breadth/General Education</b> .....	<b>15-33</b>
Satisfaction of General Education requirement .....	6-24
At least one upper division course from each of the following areas, with approval of adviser, (1) resource management, (2) environmental law, (3) environmental economics and decision making.....	9
<b>Depth Subject Matter</b> .....	<b>30</b>
Soil Science 100.....	4
Water Science 100 .....	4
Additional upper division units in soil science and water science.....	22
<b>Restricted Electives</b> .....	<b>27</b>
To supplement or expand areas of student interest selected with approval of adviser.....	24
Special study or experience (192 or 199 course in the major area).....	3
<b>Unrestricted electives</b> .....	<b>9-28</b>
<b>Total Units for the Degree</b> .....	<b>180</b>

**Specific Courses of Instruction.** For specific courses of instruction in this major, see course listings under Atmospheric Science, Plant Science, Resource Sciences, Soil Science, and Water Science.

**Major Adviser.** J.W. Biggar (*Land, Air and Water Resources*).

**Advising Center** for the major is located in 122 Hoagland Hall (916-752-1669).

**Graduate Study.** Graduate programs are available in Soil Science as well as Water Science. Detailed information can be obtained from the Graduate Adviser and the *Graduate Announcement*. See also the Graduate Division section in this catalog.

**Related Courses.** See courses in Agricultural Economics, Agricultural Science and Management, Agronomy, Botany, Chemistry, Engineering: Agricultural, Engineering: Civil, Environmental Studies, Environmental Toxicology, Geology, International Agricultural Development, Range Science, and Vegetable Crops.

## Soil Science

See **Soil Science, below; Soil Science (A Graduate Group); and Soil and Water Science**

## Soil Science

(College of Agricultural and Environmental Sciences)

### Faculty

See under the Department of Land, Air and Water Resources.

**Graduate Study.** Programs of study leading to the M.S. and Ph.D. degrees in Soil Science are available. Information regarding these programs can be obtained from the graduate adviser and the *Graduate Announcement*. See also the Graduate Division section in this catalog.

**Graduate Adviser.** M.J. Singer, (*Land, Air, and Water Resources*).

### Courses in Soil Science

Questions pertaining to the following courses should be directed to the instructor or to the Resource Sciences Teaching Center, 122 Hoagland Hall (916-752-1669).

### Lower Division Courses

**10. Concepts of Soil Science** (3) I. Dahlgren, Zasoski  
Lecture—3 hours; optional Saturday field trip. Not open to students who have received credit for course 100 or similar introductory soil science course. Study of soils as natural bodies formed by interactive environmental processes; their response to use and management; taxonomic and capability classifications; conservation practices for preservation of soil resources. Intended for students with diverse interests and backgrounds.

**92. Soil Science Internship** (1-12) I, II, III. The Staff (Chairperson in charge)  
Laboratory—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work-learn experience off and on campus in soil science. Internship supervised by a member of the faculty. (P/NP grading only.)

### Upper Division Courses

**100. Principles of Soil Science** (4) I. Munns  
Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 1A-1B, Physics 1A-1B, Biological Sciences 1A, and consent of instructor; Geology 50, Biological Sciences 1C, Microbiology 2, and Chemistry 8A recommended. Formation, properties and behavior of soils. Nature and interactions of solid, aqueous, gaseous, and biotic components. Soil-plant-atmosphere relationships. Soil development and geography, management, and conservation.

**102. Soil and Water Chemistry** (5) II. Bureau  
Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 100 or the equivalent preparation in introductory earth science or consent of instructor. Chemical nature of the mineral and organic constituents of soil and of the soil solution; ion exchange and other colloidal phenomena including the effect of soil amendments and fertilizers; microbiological processes in soils.

**105. Field Studies of Soil Resources** (8) Extra-session summer. Dahlgren, Singer, Southard  
On campus—daily 1 week; study tour—daily 5 weeks. Prerequisite: consent of instructor; course 120 recommended. *In situ* soil studies with emphasis on the interactions between soil characteristics and kinds of land use. Field identification and evaluation of soils for agricultural, range, forest, urban, and other uses.

**107. Soil Physics** (4) I. Rolston  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100, Water Science 100, Mathematics 16A, or the equivalent. Description of soil physical properties. Principles of water, gas, heat, and solute movement in soil with selected examples related to soil and water management. Influence of soil physical properties on transfer processes.

**109. Soil Fertility and Fertilizers** (4) III. The Staff  
Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100 or the equivalent preparation in elements of soil science. Forms and availability of plant nutrient elements in soils; effects of fertilizers and soil amendments on crop and soil characteristics; conduct and interpretation of soil fertility assays.

**111. Geomicrobiology** (4) II. Scow  
Lecture—3 hours; laboratory—3 hours. Prerequisite: general chemistry and an introductory course in biology. Major groups of microorganisms in the geosphere and their responses to environmental variables. Activities of microorganisms in relation to water pollution, solid waste disposal, pesticide degradation, and soil fertility.

**118. Soils in Land Use and the Environment** (4) III. Singer  
Lecture—3 hours; discussion—1 hour; two one-day field trips. 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.

### 120. Soil Genesis, Morphology, and Classification

(5) III. Southard  
Lecture—4 hours; laboratory—3 hours (includes five one-day weekend field trips). Prerequisite: course 100 and Geology 1; or consent of instructor. Recognition and description of soils; chemical and physical processes of soil formation, including salt-affected soils; factors of soil formation; and introduction to soil classification with emphasis on soil taxonomy.

**123. Soil Taxonomy** (3) II. The Staff  
Lecture—1 1/2 hours; discussion—1 1/2 hours. Prerequisite: course 120 or consent of instructor. An intermediate course in soil classification. Study and analysis of the current system of classification used by the National Cooperative Soil Survey of the United States. Practice in classifying soil individuals with emphasis on evaluating their placement in the system. Offered in even-numbered years.

**\*150. Soil and Plant Tissue Testing** (3) III. Zasoski  
Lecture—3 hours. Prerequisite: course 109, an upper division crop production course, and consent of instructor. Philosophy, conduct, and use of soil and plant tissue analysis in management of soil fertility, in diagnosis of crop nutritional program, and in crop quality assessment.

**192. Soil Science Internship** (1-12) I, II, III. The Staff (Chairperson in charge)  
Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learn experience off and on campus in soil science. Internship supervised by a member of the faculty. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
(P/NP grading only.)

### Graduate Courses

**\*207. Transport Processes in Soils** (3) II. Rolston  
Lecture—3 hours. Prerequisite: Mathematics 22B and course 107. Physical and mathematical description of nonsteady transport processes in soil. Emphasis on water, heat, gas, and solute flow, and the movement and transformation of soluble materials during leaching and irrigation.

**208. Soil-Plant Interrelationships** (3) II. The Staff  
Lecture—3 hours. Prerequisite: course 100; Botany 112; 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.

**211. Soil Microbiology** (2) III. Scow  
Lecture—2 hours. Prerequisite: Chemistry 8B, course 102, or consent of instructor. Activities of some important groups of soil microorganisms, metabolism of organic substances in soil including pesticides; influence of microbial activities on soil properties, microbial activities in soil in relation to some environmental problems.

**214. Soil Mineralogy** (5) III. Dahlgren  
Lecture—3 hours; laboratory—6 hours. Prerequisite: course in soil chemistry or consent of instructor. Nature, properties, and occurrence of the common minerals in soils and rocks. Weathering reactions and stability of minerals in the weathering environment. Application of analytical methods in mineral analysis, including x-ray, microscopic and chemical analysis for characterization of mineral systems. Offered in odd-numbered years.

**215. Physical Chemistry of Soils** (3) III. Bureau  
Lecture—3 hours. Prerequisite: Chemistry 107B or 110B, or consent of instructor. Physicochemical, colloidal, and surface aspects of the soil system. Offered in even-numbered years.

**218. Soil Erosion and Conservation** (3) II. Singer  
Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing; courses 118, 120. Processes of soil erosion by wind and water in agricultural areas, and methods of soil conservation will be discussed.

Methods of predicting rates of soil erosion will be considered. Offered in even-numbered years.

**220. Pedology (3) II.** Southard

Lecture—1 hour; discussion—2 hours. Prerequisite: courses 120 and 123 or the equivalent, or consent of instructor. Origin, characteristics, and uses of soils. Emphasis given to soil-forming processes, soil-geomorphic relations, and the importance of soil genesis and morphology to classification and interpretation. Offered in even-numbered years.

**290. Special Topics in Soil Science (1) I, III.** The Staff

Seminar—1 hour. Prerequisite: graduate standing. Oral presentation and discussion of scientific material and procedures for review and critique of publications. (S/U grading only.)

**298. Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor.

**299. Research (1-12) I, II, III.** The Staff (Chairperson in charge) (S/U grading only.)

encouraged to complement their work in the department through studies in related areas such as Chicano studies, international relations, linguistics, comparative literature, art, history, and philosophy.

**A.B. Major Requirements:**

UNITS  
**Preparatory Subject Matter** ..... 0-33  
Spanish 1 or 1AT, 2 or 2AT, 3 or 3AT, 4 or 7A, 5 and 6 or 7B, and 28 ..... 0-33

**Depth Subject Matter** ..... 45-46

Spanish 100 ..... 3  
Spanish 103A-103B ..... 8  
Spanish 110A or 110B ..... 4  
Spanish 131 ..... 4  
Spanish 132 ..... 3  
Additional upper division units to be selected as follows: ..... 23-24

**Plan 1: Spanish Literature Emphasis**

Spanish 134 ..... 4  
Spanish 104A-104B ..... 8  
Three electives in literature (at least one must be in Spanish-American literature) ..... 12

**Plan 2: Spanish-American Literature Emphasis**

Spanish 135 or 136 ..... 4  
Spanish 105A-105B ..... 8  
Three electives in literature (at least two must be in Spanish-American literature) ..... 12

**Plan 3: Chicano Literature Emphasis**

Spanish 124 ..... 4  
Spanish 126A-126B-126C ..... 12  
Spanish 129 or 135 ..... 4  
One course from Spanish 105A-105B, 108A-108B, 137 ..... 4

**Plan 4: Spanish Language Emphasis**

Spanish 133 ..... 3  
Spanish 134, 135, or 136 ..... 4  
Spanish 137 ..... 4  
Three electives (at least one must be in literature) ..... 12

**Total Units for the Major** ..... 45-79

**Major Advisers.** M.E. Altisent, A. Chabram, G. Diaz-Migoyo, R. M. Scari, M. Torreblanca, H.J. Verani.

**Minor Program Requirements:**

UNITS  
**Portuguese** ..... 24  
Portuguese 101A or 101B ..... 4  
Portuguese 103A-103B ..... 8  
Portuguese 106 ..... 4  
Portuguese 108A or 108B ..... 4  
One course from Portuguese 114, 115, 116, 117, 118 ..... 4

UNITS  
**Spanish** ..... 25-27

Spanish 100 ..... 3  
One course in Hispanic literature (any course) ..... 4  
One course in culture from Spanish 134, 135, 136 ..... 4  
One course in advanced composition from Spanish 110A, 110B ..... 4  
One course from Spanish 131, 132, or 133 ..... 3-4  
Two elective courses acceptable for the Spanish major chosen in consultation with a major adviser ..... 7-8  
Note: Students majoring in Linguistics or Chicano Studies and minoring in Spanish should bear in mind that if Spanish courses are used to satisfy the major requirements, only one of these courses may be applied to the minor.

**Teaching Credential Subject Representative.** The Staff. See also under Teacher Education Program.

**The Master of Arts Degree.** 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. Candida-

dates will be recommended for admission to graduate studies in Spanish provided they meet the requirements of the Graduate Division and the Department of Spanish. Detailed information may be obtained by writing to the Chairperson of the Spanish Department.

**The Degree of Doctor of Philosophy.** The Department offers programs of study and research leading to the Ph.D. degree. Detailed information may be obtained by writing to the Chairperson of the Spanish Department.

**Graduate Adviser.** H. Verani.

**Courses in Portuguese**

**Lower Division Courses**

**1. Elementary Portuguese (5) I.** The Staff

Discussion—1 hour; laboratory—1 hour; recitation—3 hours. Portuguese grammar, conversation, and reading. (Students who have successfully completed, with a C- or better, Portuguese 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.)

**2. Elementary Portuguese (5) II.** The Staff

Discussion—1 hour; laboratory—1 hour; recitation—3 hours. Prerequisite: course 1 or consent of instructor. Continuation of course 1.

**3. Elementary Portuguese (5) III.** The Staff

Discussion—1 hour; laboratory—1 hour; recitation—3 hours. Prerequisite: course 2 or consent of instructor. Continuation of course 2.

**4. Intermediate Portuguese (5) III.** The Staff

Lecture—4 hours; laboratory—1 hour. Prerequisite: course 3 or the equivalent, or consent of instructor. Readings, class discussions, and analysis of texts to enhance the students' command of the structures and categories of Portuguese grammar.

**5. Intermediate Portuguese (5) II.** The Staff

Lecture—4 hours; laboratory—1 hour. Prerequisite: course 4 or the equivalent, or consent of instructor. Continuation of course 4, focusing on Luso-Brazilian narrative, drama, expository prose, and poetry. In-depth study of syntax with emphasis on the verbal tenses and moods.

**Upper Division Courses**

**101A. Advanced Grammar and Composition in Portuguese (4) I.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or the equivalent, or consent of instructor. Readings, class discussions, and written analyses of Portuguese essays and articles. Offered in even-numbered years.

**101B. Advanced Grammar and Composition in Portuguese (4) II.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or the equivalent, or consent of instructor. Readings, class discussions, and written analyses of Portuguese essays and articles. Offered in odd-numbered years.

**103A. Survey of Portuguese Literature (4) I.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or the equivalent. Historical survey of the important periods of Portuguese literature: Medieval, Classic, and Baroque. Offered in even-numbered years.

**103B. Survey of Portuguese Literature (4) II.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or the equivalent. Historical survey of the important periods of Portuguese literature: the nineteenth century, Romanticism, modern realism, Modernism, and the Contemporary period. Offered in odd-numbered years.

**\*106. Survey of Brazilian Literature (4) III.** The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or the equivalent. Colonial period of Brazilian literature: Baroque, Romanticism, Realism, Sym-

## Soil Science (A Graduate Group)

Dennis E. Rolston, Ph.D., Chairperson of the Group Group Office, 122 Hoagland Hall (916-752-1669)

**Graduate Study.** The Graduate Group in Soil Science offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information regarding the programs, address the chairperson of the group.

**Graduate Advisers.** Consult the Group Office.

## Spanish

(College of Letters and Science)

Germán Gullón, Ph.D., Chairperson of the Department

Department Office (Spanish and Classics), 616 Sproul Hall (916-752-0835)

**Faculty**

Marta E. Altisent, Ph.D., Associate Professor  
Samuel G. Armistead, Ph.D., Professor  
Donald G. Castanien, Ph.D., Professor Emeritus  
Angie C. Chabram, Ph.D., Assistant Professor  
Gonzalo Díaz-Migoyo, Ph.D., Professor  
Zunilda Gertel, Ph.D., Professor  
Mario González, Ph.D., Lecturer Emeritus  
Germán Gullón, Ph.D., Professor  
Didier T. Jaén, Ph.D., Professor  
Daniel S. Keller, Ph.D., Professor Emeritus  
Almerindo E. Ojeda, Ph.D., Assistant Professor  
Fabíán A. Samaniego, M.A., Senior Lecturer  
Antonio Sánchez-Romeralo, Ph.D., Professor  
Robert M. Scari, Ph.D., Professor  
Máximo Torreblanca, Ph.D., Professor  
Hugo J. Verani, Ph.D., Professor

**Faculty**

Raquel Machado, Visiting Lecturer (Portuguese)

### The Major Program

The major in Spanish is designed to develop competence in the spoken and written language and to provide the possibility of emphasis either on language or on literature, depending upon each student's professional goal. The program, alone or in combination with other major programs, may lead to advanced study of the language or literatures 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, or business. Spanish majors are strongly

bolism, Modernism. Modern trends in fiction and poetry. Offered in even-numbered years.

**108A. Culture and Civilization of Portugal and Brazil** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or the equivalent. Portuguese and Brazilian civilization through its social institutions, art, cinema, literature and music. Offered in even-numbered years.

**108B. Culture and Civilization of Portugal and Brazil** (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5 or the equivalent. Portuguese and Brazilian civilization through its social institutions, art, cinema, literature and music. Offered in odd-numbered years.

**114. Luis de Camoens** (4) III. The Staff

Lecture—1 hour; discussion—3 hours. Prerequisite: course 5 or the equivalent. Lyricism of Camoens including the themes, language and style of the "redondilhas". "Medida nova" poetry. Sources, characteristics, content and meaning of the Camoens "Os Lusíadas". Offered in even-numbered years.

**115. Brazilian Novel of the Twentieth Century** (4) I. The Staff

Discussion—4 hours. Prerequisite: course 5 or the equivalent. Leading Brazilian novelists from the late nineteenth century to the present. Machado de Assis, Aluísio de Azevedo, Graciliano Ramos, Lins do Rego, Jorge Amado and Érico Veríssimo. Offered in even-numbered years.

**116. Modern Portuguese Poetry** (4) III. The Staff

Discussion—4 hours. Prerequisite: course 5 or the equivalent. The "Orpheu" group of poets with emphasis on anguish and narcissism in Mário de Sá Carneiro; Fernando Pessoa and his heteronomous creations Alberto Caeiro, Alvaro de Campos, and Ricardo Reis. Offered in even-numbered years.

**117. Modern Brazilian Poetry** (4) II. The Staff

Discussion—4 hours. Prerequisite: course 5 or the equivalent. Modernism in the poetry of Mário Andrade, Oswald de Andrade and Manuel Bandeira, considered as the leading exponents of the so-called "Movimento de 22". Offered in even-numbered years.

**118. Modern Portuguese Prose Fiction** (4) III. The Staff

Lecture—1 hour; discussion—3 hours. Prerequisite: course 5 or the equivalent. Neo-realism to existentialism in the twentieth century novel of Alves Redol, Gomes Ferreira, Carlos de Oliveira, Fernando Namora, Vergílio Ferreira. The original contributions of Bessa Lüls. Offered in even-numbered years.

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

## Courses in Spanish

### Lower Division Courses

**1. Elementary Spanish** (5) I, II, III. The Staff

(Samaniego in charge)

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. (Students who have successfully completed, with a C- or better, Spanish 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.)

**1ATA-1ATB-1ATC. Individualized Instruction in Elementary Spanish** (1-2-2) I-II-III. (Samaniego in charge)

The three segments of course 1AT correspond to course 1. Student-instructor contacts consisting of individual tutoring conversation practice and testing periods. (Students who have successfully completed, with a C- or better, Spanish 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.)

**2. Elementary Spanish** (5) I, II, III. The Staff

(Samaniego in charge)

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 1. Continuation of course 1 in the areas of grammar and basic language skills.

**2ATA-2ATB-2ATC. Individualized Instruction in Elementary Spanish** (1-2-2) I-II-III. (Samaniego in charge)

Prerequisite: course 1 or 1ATA-1ATB-1ATC. The three segments of course 2AT correspond to course 2. Student-instructor contacts consisting of individual tutoring, conversation practice and testing periods.

**3. Elementary Spanish** (5) I, II, III. The Staff

(Samaniego in charge)

Discussion—5 hours; laboratory—1 hour. Prerequisite: course 2. Completion of grammar sequence and continuing practice of all language skills through cultural texts.

**3ATA-3ATB-3ATC. Individualized Instruction in Spanish** (1-2-2) I-II-III. (Samaniego in charge)

Autotutorial. Prerequisite: course 2 or 2ATA-2ATB-2ATC. Continuation of course 2ATA-2ATB-2ATC.

**4. Intermediate Spanish** (5) I, II, III. The Staff

Discussion—1 hour; recitation—4 hours. Prerequisite: course 3. Grammar review through oral and written exercises, and expansion of vocabulary through reading of modern texts.

**5. Intermediate Spanish** (3) I, II, III. The Staff

Recitation—3 hours. Prerequisite: course 4. Continuation of course 4.

**6. Introduction to Reading** (3) I, II, III. The Staff

Recitation—3 hours. Prerequisite: course 4. Reading of selected Spanish texts to acquaint students with a variety of written styles. Exercises and tests will emphasize comprehension and will focus on particular problems of grammar and vocabulary.

**7A-7B. Grammar and Composition for Native Speakers** (4-4) I-II. Chabram

Discussion—3 hours; compositions. Prerequisite: course 3 or the equivalent, or consent of instructor. Intensive grammar review and composition. Open to students whose native language is Spanish or to those who are bilingual. Not open to graduates of high schools where Spanish was the language of instruction. Open to majors and non-majors.

**8A. Elementary Spanish Conversation** (2) I, II, III. The Staff

Discussion—2 hours. Prerequisite: course 3; course 4 (concurrently) recommended. Directed group conversation including practical exercises in phonetics and language pronunciation. Vocabulary expansion and emphasis on grammatical accuracy. Limited enrollment. (P/NP grading only.)

**8B. Elementary Spanish Conversation** (2) I, II, III. The Staff

Discussion—2 hours. Prerequisite: course 4 or 8A; course 5 (concurrently) recommended. Continuation of course 8A. Limited enrollment. (P/NP grading only.)

**9. Intermediate Spanish Conversation** (2) I, II, III. The Staff

Discussion—2 hours. Prerequisite: course 5 or 8B; course 28 (concurrently) recommended. Directed group conversation with special emphasis on development of fluency in oral expression for the more advanced student. Limited enrollment. (P/NP grading only.)

**28. Spanish Composition** (4) I, II, III. The Staff

Discussion—3 hours; written assignments. Prerequisite: course 5. Development of writing skills through correct use of idiomatic expressions, practice in writing summaries and original compositions.

**34. Mexico in Its Literature** (3) II. Chabram

Lecture—3 hours. Introduction to significant literary trends in Mexican literature. Lectures and discussions in English, readings in either English or Spanish of representative works by major contemporary authors. May not be counted as part of the major or minor in Spanish.

**35. Survey of Mexican Culture** (3) III. Chabram

Lecture—3 hours. Indian cultural patterns before the discovery of Mexico; development of Mexican civilization during the Spanish conquest, the national period, and the Revolution of 1910. Conducted in English. May not be counted as part of the major or minor in Spanish.

**98. Directed Group Study** (1-5) I, II, III. The Staff

(Chairperson in charge)

Prerequisite: consent of instructor and Department Chairperson. Primarily for lower division students. (P/NP grading only.)

### Upper Division Courses

Course 100 is prerequisite to all upper division literature courses.

**100. Introduction to Principles of Criticism** (3) I, II, III. Altisent in charge

Lecture—3 hours. Prerequisite: course 28. Designed to provide students with the skills to recognize the basic principles involved in literary criticism and a useful terminology to analyze the different genres of Hispanic literature.

**103A. Hispanic Literature I: Medieval and Golden Age** (4) I, II, III. Armistead, Díaz-Migoyo, Sánchez-Romeralo

Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the study of the principal authors, works, and movements of Medieval and Golden Age literature of Spain, and of Spanish-American colonial literature.

**103B. Hispanic Literature I: Medieval and Golden Age** (4) I, II, III. Armistead, Díaz-Migoyo, Sánchez-Romeralo

Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the study of the principal authors, works, and movements of Medieval and Golden Age literature of Spain, and Spanish-American colonial literature.

**104A. Hispanic Literature II: Modern Peninsular**

(4) I. Altisent, Gullón, Sánchez-Romeralo, Scarl

Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the study of the principal authors, works, and movements of modern Spanish literature from 1700 to 1900. Offered in odd-numbered years.

**104B. Hispanic Literature II: Modern Peninsular**

(4) I. Altisent, Gullón, Sánchez-Romeralo, Scarl

Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the study of the principal authors, works, and movements of modern Spanish literature from 1900 to the present. Offered in even-numbered years.

**105A. Hispanic Literature III: Modern Spanish-American** (4) II. Gertel, Jaén, Verani

Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the principal authors, works, and movements of Spanish-American literature of the nineteenth and twentieth centuries. Offered once every four quarters.

**105B. Hispanic Literature III: Modern Spanish-American** (4) III. Gertel, Jaén, Verani

Lecture—3 hours; written reports. Prerequisite: course 100. Introduction to the principal authors, works, and movements of Spanish-American literature of the nineteenth and twentieth centuries. Continuation of course 105A.

**108A. Spanish-American Prose of the Twentieth Century** (4) III. Gertel, Jaén, Verani

Lecture—3 hours; conferences and reports. Prerequisite: course 100. Emphasis on the development of the novel. Offered in odd-numbered years.

**108B. Spanish-American Prose of the Twentieth Century** (4) III. Chabram, Jaén

Lecture—3 hours; conferences and reports. Prerequisite: course 100. Emphasis on the essay. Offered in even-numbered years.

**109. Spanish Drama of the Golden Age** (4) III.

Sánchez-Romeralo  
Lecture—3 hours; conferences and reports. Prerequisite: course 100. Offered in even-numbered years.

**110A. Advanced Spanish Composition I (4) I.** The Staff

Discussion—3 hours; written reports. Prerequisite: course 28. Practice in expository writing, with an aim toward refinement and expansion of vocabulary.

**110B. Advanced Spanish Composition II (4) II.** The Staff

Discussion—3 hours; written reports. Prerequisite: course 28. Practice in creative writing, with an aim toward refinement and appreciation of written expression and expansion of vocabulary.

**111. Don Quijote (4) II.** Diaz-Migoyo

Lecture—3 hours; written reports. Prerequisite: course 100.

**112. Medieval Masterworks (4) I.** Armistead

Lecture—3 hours; term paper. Prerequisite: course 100. Study of major works of Medieval Spanish literature from its origins up to the fifteenth century. Offered in odd-numbered years.

**114. Spanish Romantic Literature (4) II.** Gullón, Scari

Lecture—3 hours; conferences and reports. Prerequisite: course 100. Readings and lectures on romantic writers of the first half of the nineteenth century with emphasis on drama and poetry. Offered in even-numbered years.

**115. Lyric Poetry of the Golden Age (4) III.**

Sánchez-Romeralo

Lecture—3 hours; term paper. Prerequisite: course 100. Offered in odd-numbered years.

**119. Spanish Novel of the Nineteenth Century (4)**

III. Gullón, Scari

Lecture—3 hours. Prerequisite: course 100. Offered in odd-numbered years.

**120A. Twentieth-Century Spanish Fiction (4) I.**

Altisent, Diaz-Migoyo, Gullón

Lecture—3 hours; term paper. Prerequisite: course 100. Study of the main literary trends and authors of the modern Spanish novel and short story. Selected works by Unamuno, Valle-Inclán, Blasco Ibañez, Cela and others will be covered.

**120B. Twentieth-Century Spanish Drama (4) III.**

Altisent

Lecture—3 hours; term paper. Prerequisite: course 100. Offered in odd-numbered years.

**120C. Twentieth-Century Spanish Poetry (4) III.**

Sánchez-Romeralo

Lecture—3 hours; term paper. Prerequisite: course 100. Offered in even-numbered years.

**124. Chicano Culture (4) I.** Chabram

Lecture—3 hours; term paper. Prerequisite: course 2 or consent of instructor. Study of Chicano culture in the Southwest from 1598 to the present, emphasis on the period after 1848. Lectures and discussions in English; readings in English and/or Spanish. May not be counted as part of major in Spanish. Offered in odd-numbered years.

**125. Spanish-American Modernism (4) II.** Gertel, Jaén, Verani

Lecture—3 hours; term paper. Prerequisite: course 100. Study of the poetry and prose of Spanish-American Modernismo (1880 to 1916). Offered in even-numbered years.

**126A. Chicano Literature (4) I.** Chabram

Lecture—3 hours; term paper. Prerequisite: course 100; consent of instructor. Intensive study of select topics in Chicano literature including Chicano novel. Bilingual readings. Lectures, discussions, and writing in Spanish. Offered in even-numbered years.

**126B. Chicano Literature (4) II.** Chabram

Lecture—3 hours; term paper. Prerequisite: course 100; consent of instructor. Intensive study of select topics in Chicano literature including Chicano theater. Bilingual readings. Lectures, discussions, and writing in Spanish. Offered in odd-numbered years.

**126C. Chicano Literature (4) III.** Chabram

Lecture—3 hours; term paper. Prerequisite: course 100; consent of instructor. Intensive study of select topics in Chicano literature including Chicano poetry. Bilingual readings. Lectures, discussions, and writing in Spanish. Offered in odd-numbered years.

**127. Contemporary Spanish-American Poetry (4)**

III. Gertel, Jaén, Verani

Lecture—3 hours; term paper. Prerequisite: course 100. Development of Spanish-American poetry from the end of Modernism to the present. Emphasis on works of Huidobro, Neruda, Vallejo, Borges, and Octavio Paz. Offered in even-numbered years.

**128. Contemporary Spanish-American Short Story (4) II.** Gertel, Jaén, Verani

Lecture—3 hours; term paper. Prerequisite: course 100. Literary trends in the development of the short story in Spanish America as seen in the representative works of major contemporary authors. Offered in even-numbered years.

**129. The Mexican Novel (4) III.** Chabram, Gertel, Jaén, Verani

Lecture—3 hours; term paper. Prerequisite: course 100 or consent of instructor. Major figures in the development of the Mexican novel. Offered in odd-numbered years.

**131. Modern Spanish Syntax (4) I.** Ojeda

Lecture—3 hours; conferences and reports. Prerequisite: course 28 or consent of instructor. Study of word relationships in European and American Spanish, with special attention to syntax of verbs.

**132. Introduction to Spanish Linguistics (3) III.**

Ojeda, Torreblanca

Lecture—3 hours. Prerequisite: course 28 or consent of instructor. Principles of classical phonemics and morphemics together with more recent developments; descriptive analysis of modern Spanish sounds and forms. Theoretical and practical comparison with English and other Romance Languages.

**133. Spanish Phonetics (3) I, II.** Torreblanca

Lecture—3 hours. Prerequisite: course 28 or consent of instructor. The sound structure of modern Spanish; theoretical analysis of selected problems in pronunciation. Strongly recommended for prospective teachers.

**134. Survey of Spanish Culture (4) I.** Altisent, Diaz-Migoyo

Lecture—3 hours; paper. Prerequisite: course 28. Offered in even-numbered years.

**135. Survey of Mexican Culture (4) II.** Chabram

Lecture—3 hours; paper. Prerequisite: course 28 or consent of instructor. Offered in odd-numbered years.

**136. Survey of Spanish-American Culture (4) II, III.** Gertel, Jaén, Verani

Lecture—3 hours; term paper. Prerequisite: course 28. Major developments in the arts and social institutions of Spanish-American areas other than Mexico. Readings, lectures, and discussions in Spanish.

**137. Contrastive Spanish-English Morphosyntax (4) II.** Ojeda, Torreblanca

Lecture—3 hours; individual and group conferences; term paper. Prerequisite: course 28 or the equivalent; Linguistics 1 or 150 recommended or consent of instructor. Contrastive grammatical analysis of English and Spanish, error analysis, introduction to methods and concepts of structuralist and transformational linguistics, the basic elements of morphology, constituent elements of the noun and verb phrases.

**138. Contemporary Spanish-American Drama (4)**

II. Gertel, Jaén, Verani

Lecture—3 hours; term paper. Prerequisite: course 100. Study of major authors, significant trends, as well as origins and development of the genre.

**149. Latin-American Literature in Translation (4)**

III. Gertel, Jaén, Verani

Lecture—3 hours; term paper. Prerequisite: course 100. Reading, lectures, and discussion in English of works by Neruda, Vallejo, Borges, García Márquez, Paz, and others. May not be counted toward major in Spanish. Offered in odd-numbered years. General Education credit: Civilization and Culture/Non-Introductory. Recommended GE preparation: Comparative Literature 1, 2, or 3.

**150. Masterpieces of Spanish Literature (4) I.**

Armistead, Gullón, Scari

Lecture—3 hours; paper. Readings, lectures, and

discussion in English. May not be counted as part of the major in Spanish.

**151. Study of a Major Writer (4) I, II, III.** The Staff

Lecture—3 hours; term paper. Prerequisite: course 100. May be repeated for credit with consent of instructor.

**192I. Internship in Spanish (1-12) I, II, III.** The Staff

(Chairperson in charge)

Independent study—3-36 hours. Prerequisite: course 28; junior standing; major in Spanish, Chicano Studies, or a related field. Internships in fields where Spanish language skills can be used and perfected (teaching, counseling, translating-interpreting, etc.). May be repeated for credit for a total of 8 units. Units will not count toward the Spanish major. (P/NP grading only).

**198. Directed Group Study (1-5) I, II, III.** The Staff

(Chairperson in charge)

Prerequisite: consent of instructor and Department Chairperson. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses****200. Techniques of Literary Scholarship (4) III.**

Armistead

Seminar—3 hours; term paper. Elements of bibliography and fundamental methods of literary research. (S/U grading only.)

**209. Literary Theory and Criticism: Prose Fiction (4) III.** Diaz-Migoyo, Gertel, Gullón, Verani

Seminar—3 hours; term paper. Study of contemporary literary theories and their application to twentieth-century Spanish American prose fiction.

**210. Literary Criticism: Poetry (4) I.** Gertel, Sánchez-Romeralo

Seminar—3 hours; term paper. Offered in odd-numbered years.

**220A. History of the Spanish Language (4) I.** Torreblanca

Seminar—3 hours; term paper. Prerequisite: Latin 1.

**220B. History of the Spanish Language (4) II.** Torreblanca

Seminar—3 hours; term paper. Prerequisite: Latin 1.

**221. Hispanic Dialectology (4) II.** Torreblanca

Seminar—3 hours; term paper. Prerequisite: course 220A or consent of instructor. Descriptive and historical study of the distinctive features of Peninsular and American Spanish dialects.

**225A. Masterworks of Medieval Spanish Literature (4) I.** Armistead

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of early Medieval Spanish literature: epic poetry, clerical poetry and the origins of Castilian prose. Offered in even-numbered years.

**225B. Masterworks of Medieval Spanish Literature (4) II.** Armistead

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of late Medieval prose works: didactic prose; sentimental and chivalric novel; *La Celestina*. Offered in even-numbered years.

**225C. Medieval Spanish Epic (4) III.** Armistead

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of major works of Medieval Castilian heroic poetry from its origins through the decadence of the genre in the fifteenth century. Offered in odd-numbered years.

**225D. Medieval Lyric (4) I.** Armistead

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of representative early lyric poetry in the various peninsular languages. Offered in odd-numbered years.

**226. *El libro de buen amor* (4) II.** Armistead

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the fourteenth-century didactic poem, *El libro de buen amor* (*The Book of Good Love*) by Juan Ruiz, Archpriest of Hita. Offered in odd-numbered years.

**227. *El Romancero* (4) III.** Armistead

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of Hispanic ballad literature from the fifteenth century to the present. Offered in odd-numbered years.

**228. Folk Literature of the Hispanic World (4) I.**

Armistead

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the various genres of oral traditional literature among the Hispanic peoples. Offered in even-numbered years.

**229. Spanish Literature of the Early Renaissance (4) I.**

Armistead

Seminar—3 hours; term paper. Spanish literature, 1450-1550, with emphasis on *La Celestina*.

**231A. Spanish Literature of the Golden Age: Lyric Poetry (4) I.**

Sánchez-Romeralo

Seminar—3 hours; term paper. Sixteenth-century currents in Spanish poetry. Offered in odd-numbered years.

**231B. Spanish Literature of the Golden Age: Lyric Poetry (4) II.**

Sánchez-Romeralo

Seminar—3 hours; term paper. Seventeenth-century currents in Spanish poetry. Offered in even-numbered years.

**231C. Spanish Literature of the Golden Age: Literature of Ideas (4) II.**

Díaz-Migoyo

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Offered in odd-numbered years.

**231D. Spanish Literature of the Golden Age: Narrative (4) II.**

Díaz-Migoyo

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Offered in even-numbered years.

**231E. Spanish Literature of the Golden Age: The Drama (4) II.**

Sánchez-Romeralo

Seminar—3 hours; term paper. Offered in odd-numbered years.

**232. *Cervantes* (4) I.**

Díaz-Migoyo

Seminar—3 hours; term paper. Major works of Cervantes and of the principal Cervantine critics. Offered in odd-numbered years.

**234A. Twentieth-Century Spanish Poetry (4) I.**

Sánchez-Romeralo

Seminar—3 hours; term paper. From 1898 up to the Generation of 1927.

**234B. Twentieth-Century Spanish Poetry (4) II.**

Sánchez-Romeralo

Seminar—3 hours; term paper. New trends in Spanish poetry from 1927 to the present.

**235A. Twentieth-Century Spanish Novel (1900-1936) (4) I.**

Altisent, Gullón

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the modern Spanish novel until the Civil War. Emphasis on Modernism, Generation of 1898, Vanguardism, and other literary trends through selected works by Valle-Inclán, Baroja, Unamuno, Azorín, Gómez de la Serna, and others. Offered in odd-numbered years.

**235B. Twentieth-Century Spanish Novel (4) II.**

Altisent, Gullón

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the main narrative trends in the contemporary Spanish novel through discussion of works by Cela, Goytisolo, Martín Santos, Sánchez Ferlosio, Benet, and/or others. Offered in even-numbered years.

**236. Twentieth-Century Spanish Thinkers (4) III.**

Gullón, Scari

Seminar—3 hours; term paper. Major thinkers from Ganivet to Unamuno and Ortega y Gasset. Emphasis will be placed on the relationships between Spanish thought and European philosophical currents. Offered in even-numbered years.

**237. Twentieth-Century Spanish Drama (4) I.**

Altisent

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of the main literary trends and authors of the modern Spanish drama. Dramatists like Valle-Inclán, Lorca, Buero

Vallejo, Arrabal, Nieva, and others will be covered. Offered in even-numbered years.

**238. Spanish Romanticism (4) I.**

Gullón, Scari

Seminar—3 hours; term paper. Sources and development of Romanticism in Spain, particularly in poetry and drama.

**239. Galdós and Spanish Realism (4) II.**

Gullón, Scari

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Offered in even-numbered years.

**240. Twentieth-Century Spanish-American Drama (4) III.**

Gertel

Seminar—4 hours. Prerequisite: graduate standing or consent of instructor. Major Spanish-American dramatists from Florencio Sanchez to the present. Offered in even-numbered years.

**241A. Spanish-American Novel, 1900-1950 (4) I.**

Gertel, Verani

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of main trends and key authors in Spanish-America in the first half of the twentieth century. Offered in even-numbered years.

**241B. New Trends In Spanish-American Fiction (4) II.**

Gertel, Verani

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Recent development in Spanish-American narrative. Emphasis on innovative language and structure. Offered in even-numbered years.

**242. The Mexican Novel (4) III.**

Gertel, Jaén

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Emphasis on twentieth-century Mexican novel from Azuela, Yáñez, Rulfo, Fuentes to the present. Offered in odd-numbered years.

**243. Spanish-American Short Story (4) III.**

Gertel, Verani

Seminar—3 hours; term paper. Works by major writers, with emphasis on twentieth-century authors such as Quiroga, Borges, García Márquez, Cortázar, and Rulfo.

**245. Dario and Modernism (4) I.**

Gertel, Verani

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Study of poetry and prose of Spanish-American Modernismo (1880 to 1916). Offered in odd-numbered years.

**247. New Directions in Spanish-American Poetry (4) III.**

Gertel, Verani

Seminar—3 hours; term paper. Offered in even-numbered years.

**248. The Spanish-American Essay (4) II.**

Gertel

Seminar—3 hours; term paper. Major Spanish-American essayists from Sarmiento to Octavio Paz. Offered in odd-numbered years.

**251. Studies on a Major Writer, Period, or Genre (4) III.**

The Staff

Seminar—3 hours; term paper. Prerequisite: graduate standing or consent of instructor. Artistic development of a major 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.

**299. Research (1-12) I, II, III.**

The Staff (Chairperson in charge)

(S/U grading only.)

**Professional Courses****300. The Teaching of Spanish (3) III.**

Samaniego

Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in Spanish.

**390A. Problems in Teaching Spanish at College Level (3) I.**

Samaniego

Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing. Theoretical instruction in modern teaching methods and demonstration of their practical application. Required of graduate teaching assistants.

**390B. Problems in Teaching Spanish at College Level (1) III.**

Samaniego

Discussion—1 hour. Prerequisite: graduate standing. Theoretical instruction in modern teaching methods and demonstration of their practical application. Intended primarily for graduate teaching assistants. (S/U grading only.)

**Speech****See Rhetoric and Communication****Statistics**

(Intercollege Division)

George G. Roussas, Ph.D., Chairperson of the Division and Associate Dean of Statistics Division Office, 469 Kerr Hall (916-752-2361)

**Faculty**

P.K. Bhattacharya, Ph.D., Professor  
Prabir Burman, Ph.D., Assistant Professor  
Christian Drake, Ph.D., Assistant Professor  
Alan P. Fenech, Ph.D., Associate Professor  
Wesley O. Johnson, Ph.D., Associate Professor  
Yue-Pok (Ed) Mack, Ph.D., Associate Professor  
Hans-Georg Mueller, Ph.D., Associate Professor  
George G. Roussas, Ph.D., Professor  
Francisco J. Samaniego, Ph.D., Professor  
Robert H. Shurnway, Ph.D., Professor  
Chih-Ling Tsai, Ph.D., Associate Professor  
Jessica M. Utts, Ph.D., Associate Professor  
Jane-Ling Wang, Ph.D., Associate Professor  
Alvin D. Wiggins, Ph.D., Professor

**Statistics** is a subject which touches our lives virtually every day in a variety of ways, from the amount we pay for insurance to the television shows which are left on the air. It has been developed to enable us to make inferences about entire populations, based on samples extracted from those populations. Thus, statistical methods can be applied to problems from almost every discipline and they are vitally important to researchers in agricultural, social, engineering, and medical sciences.

The Division of Statistics offers courses to fulfill needs at all levels. A minor in statistics gives the student a basic grounding in both theory and applications and would be a valuable complement to almost any major program. An undergraduate major in statistics is sufficient preparation for either a career or graduate study in the field.

**Entry-level courses** for students are as follows:

- (a) Statistics 13, 32, and 102. These three courses are essentially equivalent in content, each designed as an introduction to the basic concepts and methods of probability and statistics. However, they differ from one another in the background expected of the student. Courses 13 and 102 require only high school algebra, although 102 is taught at a faster pace and covers somewhat more material. Course 32 is recommended as an alternative for students who have some background in computer programming and calculus; here students complement the analytical side of the lecture material by writing simulation programs which develop valuable intuitive insight.
- (b) Statistics 130A-130B and 131A-131B-131C. These courses require calculus, and present both the methods of statistics and the probabilistic background on which these methods are based. The two sequences cover the same material, but the 131 course sequence goes into more depth. Neither sequence,

- course 130 or 131, requires a prerequisite from the set, courses 13, 32, and 102, discussed above, but students often find such a background helpful.
- (c) Statistics 120 is an alternative to Statistics 130A or 131A. It also requires calculus, but no prior knowledge of probability, and is primarily meant for Electrical Engineering students.

## The Major Programs

Probability models and statistical methods are used in a 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. Current employment opportunities include state and federal government positions with a statistician designation, industrial positions (e.g., in the actuarial series within an insurance company or in the data management unit in a health science facility), and teaching positions.

The major programs in statistics are designed to make possible a wide variety of career choices. The Bachelor of Arts degree is very flexible, facilitating a double major or extensive elective course work in a field in which statistics is applied. The Bachelor of Science degree program has two options: one emphasizes mathematics and is especially recommended as preparation for graduate study in statistics; the other emphasizes computer science. All three programs require theoretical and applied course work and underscores the strong interdependence of statistical theory and the applications of statistics.

The concurrent study of statistics and a field of applications at an advanced level will serve students well either in preparing for a career in an area of application or in preparing for graduate study. Students with a strong interest in a quantitative discipline are encouraged to pursue a double major combining statistics and this discipline.

**Statistics and Computer Science.** These two fields interact in many ways, with each discipline having applications to the other. Applied statistical work relies on computer science areas such as database management, numerical analysis, algorithm optimization and graphics, while computer science uses statistics in areas such as pattern recognition, evaluation of operating systems and simulation. Thus advanced courses in computer science are recommended for all students in statistics. In particular the degree program, Statistics—Computer Science, is designed as an integrated package combining statistics and computer science.

Students interested in one of the following major programs in Statistics are invited to meet with an undergraduate adviser for further information about planning a program.

**Preparatory Requirements.** Before applying for either the A.B. or B.S. major in Statistics, students must ordinarily complete the following courses with at least C grades:

Mathematics 21A, 21B, 21C

Mathematics 22A, 22B

Computer Science Engineering 30 or  
Engineering 5

Statistics 32

In addition, due to space limitation in the B.S. major, students admitted to this major will normally be chosen from those having at least a 3.0 grade-point average in the above courses. For further information, please contact a Statistics adviser.

## A.B. Major Requirements:

UNITS

- Preparatory Subject Matter** ..... 24-25
- Calculus, Mathematics 21A, 21B, 21C .... 12
- Linear algebra, differential equations, Mathematics 22A, 22B ..... 6
- Computer science, Computer Science Engineering 30 or Engineering 5 (or the

equivalent) ..... 3-4	
Statistics through computers, Statistics 32 ..... 3	
<b>Depth Subject Matter</b> ..... 38-39	
Analysis of variance, multiple regression, Statistics 106, 108 or the equivalent....8	
Probability and mathematical statistics, Statistics 131A, 131B, 131C .....12	
Three Statistics courses with Statistics 131B as a prerequisite .....9-10	
Related elective courses ..... 9	
Three upper division courses approved by major adviser. They may be in mathematics, computer science or in quantitative aspects of a substantive discipline. .	
<b>Total Units for the Major</b> ..... 62-64	
	UNITS
	STATISTICS ..... 19-20
	Statistics 106, 108, and 130A-130B or 131A-131B .....16
	One course in Statistics having Statistics 130B or 131B as a prerequisite .....3-4
	Preparation: Statistics 13 or 32.
	<b>Graduate Study.</b> The Graduate Group in Statistics offers study and research leading to the M.S. and Ph.D. degrees in Statistics. Detailed information concerning these degree programs, as well as information on admissions and on financial support, is available from the Division of Statistics.
	<b>Graduate Adviser.</b> F.J. Samaniego.
	<b>Statistical Consulting.</b> The Division provides a consulting service for researchers on campus. For more information, call the Statistical Laboratory Office (916-752-6096).
	<b>Courses in Statistics</b>
	<b>Lower Division Courses</b>
	<b>12. Introduction to Discrete Probability</b> (3) I. The Staff
	Lecture—3 hours. 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 even-numbered years.
	<b>13. Elementary Statistics</b> (4) I, II, III. The Staff
	Lecture—4 hours. Prerequisite: two years of high school algebra. Measures of central tendency and dispersion; binomial, normal, Student-t, and chi-square distributions; testing hypotheses; nonparametric statistics; regression and correlation theory. (Students having had courses 130A or 131A may not receive credit for Statistics 13.) (CAN Stat 2)
	<b>32. Basic Statistical Analysis Through Computers</b> (3) II, III. The Staff
	Lecture—3 hours. Prerequisite: Mathematics 16B or 21B; ability to program in a high-level computer language such as Pascal. Overview of probability modeling and statistical inference. Problem solution through mathematical analysis and computer simulation. Recommended as alternative to course 13 for students with some knowledge of calculus and computer programming.
	<b>98. Directed Group Study</b> (1-5) I, II, III. The Staff (Chairperson in charge)
	Prerequisite: consent of instructor. (P/NP grading only.)
	<b>Upper Division Courses</b>
	<b>102. Introduction to Probability Modeling and Statistical Inference</b> (4) I, II, III. The Staff
	Lecture—3 hours; discussion—1 hour. Prerequisite: two years high school algebra, and upper division standing. Introductory probability and statistics at a rigorous yet precalculus level. Topics include: proba-

Computer Science Engineering 122, or  
Computer Science Engineering 175....3

**Total Units for the Major** ..... 73-84

(Computer Science option)

**Major Adviser.** W.O. Johnson.

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 Division offers a minor program in Statistics that consists of a survey at the upper division level of the fundamentals of mathematical statistics and of the most widely used applied statistical methods.

UNITS

<b>Statistics</b> ..... 19-20	
Statistics 106, 108, and 130A-130B or 131A-131B .....16	
One course in Statistics having Statistics 130B or 131B as a prerequisite .....3-4	
Preparation: Statistics 13 or 32.	

**Graduate Study.** The Graduate Group in Statistics offers study and research leading to the M.S. and Ph.D. degrees in Statistics. Detailed information concerning these degree programs, as well as information on admissions and on financial support, is available from the Division of Statistics.

**Graduate Adviser.** F.J. Samaniego.

**Statistical Consulting.** The Division provides a consulting service for researchers on campus. For more information, call the Statistical Laboratory Office (916-752-6096).

## Courses in Statistics

### Lower Division Courses

#### 12. Introduction to Discrete Probability (3) I. The Staff

Lecture—3 hours. 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 even-numbered years.

#### 13. Elementary Statistics (4) I, II, III. The Staff

Lecture—4 hours. Prerequisite: two years of high school algebra. Measures of central tendency and dispersion; binomial, normal, Student-t, and chi-square distributions; testing hypotheses; nonparametric statistics; regression and correlation theory. (Students having had courses 130A or 131A may not receive credit for Statistics 13.) (CAN Stat 2)

#### 32. Basic Statistical Analysis Through Computers (3) II, III. The Staff

Lecture—3 hours. Prerequisite: Mathematics 16B or 21B; ability to program in a high-level computer language such as Pascal. Overview of probability modeling and statistical inference. Problem solution through mathematical analysis and computer simulation. Recommended as alternative to course 13 for students with some knowledge of calculus and computer programming.

#### 98. Directed Group Study (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

### Upper Division Courses

#### 102. Introduction to Probability Modeling and Statistical Inference (4) I, II, III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: two years high school algebra, and upper division standing. Introductory probability and statistics at a rigorous yet precalculus level. Topics include: proba-

bility models—binomial, Poisson, geometric; normal and sampling distributions; graphics; exploratory data analysis; parametric and non parametric estimation and testing; analysis of variance; regression; computing with Minitab package. Students who have had course 13 may receive only 2 units of credit for course 102.

**103. Applied Statistics for Business and Economics** (4) I, II, III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 13, 32, or 102. 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.

**104. Applied Statistical Methods: Nonparametric Statistics** (3) II. The Staff

Lecture—3 hours. Prerequisite: course 13, 32, or 102. 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 even numbered years.

**106. Applied Statistical Methods: Analysis of Variance** (4) I, II, III. The Staff

Lecture—4 hours. Prerequisite: course 13, 32, or 102. One-way and two-way fixed effects analysis of variance models. Randomized complete and incomplete block design, Latin squares. Multiple comparisons procedures. One-way random effects model.

**108. Applied Statistical Methods: Regression Analysis** (4) I, II, III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 13, 32 or 102. Simple linear regression, variable selection techniques, stepwise regression, analysis of covariance, influence measures, computing packages.

**110. Applied Statistical Methods: Multivariate Analysis** (3) I. The Staff

Lecture—3 hours. Prerequisite: courses 13, 32, or 102, and 106 or 108. Estimation of the mean vector and covariance matrix of a multivariate population. Multiple comparisons methods. Estimation of simple, multiple, and partial correlation coefficients. One-way MANOVA. Linear discriminant functions. Principal component analysis. Factor analysis. Offered in odd-numbered years.

**120. Probability and Random Variables for Engineers** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21A, 21B, 21C, and 22A. Basic concepts of probability theory with applications to electrical engineering, discrete and continuous random variables, conditional probability, combinatorics, bivariate distributions, transformation of random variables, law of large numbers, central limit theorem, and approximations.

**130A. Mathematical Statistics: Brief Course** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16B. Concepts of a probability space, conditional probability and independence, discrete and continuous random variables, moments and moment generating functions, transformation of random variables, commonly used probability models, joint distribution of random variables, correlation, marginal and conditional distributions.

**130B. Mathematical Statistics: Brief Course** (4) II. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 16B and course 130A. Sampling distributions, sums of random variables, the t, F, and  $\chi^2$  distributions, central limit theorem and applications, fundamentals of point and interval estimation, one-sample and two-sample hypotheses testing. Introduction to regression analysis, and analysis of variance.

**131A. Introduction to Probability Theory** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 21A, 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. Students who have had Mathematics 131 may not receive credit for Statistics 131A.

**131B-131C. Introduction to Mathematical Statistics** (4-4) II-III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 131A, or Mathematics 22A and 131. Sampling, methods of estimation, sampling distributions, confidence intervals, testing hypotheses, linear regression, analysis of variance, elements of large sample theory, and nonparametric inference.

**132. Engineering Statistics** (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing; one course from courses 130A, 131A, Engineering 118, or Mathematics 131. Not open to Statistics majors. Statistical estimation, hypotheses testing, correlation, simple linear regression, least squares estimation, confidence intervals, prediction intervals, multiple regression, goodness-of-fit, analysis of variance, factorial design, contingency tables, chi-square tests, applications to engineering problems.

**133. Applied Stochastic Modeling and Statistical Theory** (6) I. Samaniego

Lecture—5 hours; discussion—1 hour. Prerequisite: course 103 and Mathematics 16B, or their equivalent. Probability laws, random variables, mathematical expectation, univariate and multivariate probability models; convergence concepts, the theory of estimation, topics in hypothesis testing.

**134. Nonparametric Inference** (3) II. The Staff

Lecture—3 hours. Prerequisite: course 130B or 131B. Selected topics in nonparametric statistical inference from a one-sample and a k-sample point of view. Topics include Kolmogorov-Smirnov type tests; confidence intervals for quantiles, location and scale parameters; rank tests, dispersion tests, efficiency. Offered in odd-numbered years.

**135. Multivariate Data Analysis** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 130B or 131B. Quantitative description and analysis of social and biological problems. Multivariate statistical procedures implemented through computer methods. Applied time series, factor and cluster analysis.

**136. Applied Linear Models** (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Mathematics 22A; and either course 130B or 132; or course 131B. Introduction to regression analysis and analysis of variance within the framework of linear models: general linear model; simple and multiple linear regression, polynomial regression; one-factor and multi-factor analysis of variance; nested models, multiple comparisons; analysis of covariance.

**137. Applied Time Series Analysis** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 130B or 131B or the equivalent. Auto- and cross-correlation, spectral analysis, coherence, transfer relations, linear filters, seasonal adjustment, mean square regression, autoregressive moving average models, forecasting, Box-Jenkins methods, spectral analysis of variance, and signal detection and discrimination methods.

**138. Analysis of Categorical Data** (4) I. The Staff

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.

**141. Statistical Computing** (3) II. The Staff

Lecture—3 hours. Prerequisite: course 130A or 131A or the equivalent; one course from Computer Science Engineering 30 or Engineering 5; knowledge of regression analysis and matrix algebra. Computational aspects of linear models and nonlinear models; development of packaged statistical programs; simulation techniques; graphics.

**142. Reliability** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 130B or 131B or consent of instructor. Stochastic modeling and inference for reliability systems. Topics include: coherent systems, statistical failure models, notions of aging, maintenance policies and their optimization. Offered in odd-numbered years.

**143. Survival Analysis** (4) III. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: course 130B, or 131C (may be taken concurrently). Statistical methods for failure time data, assessing risk of failure, parametric and nonparametric estimates of probabilities for time to failure, packaged computer programs, applications to medical and life data. Selected topics from model selection, accelerated failure time models, Cox models, nonparametric methods. Offered in even-numbered years.

**144. Sampling Theory of Surveys** (3) II. The Staff

Lecture—3 hours. Prerequisite: course 130B or 131B. Description and analysis of sample surveys with applications in the social and biological sciences. Stratified and cluster sampling. Ratio estimation. Problem of nonresponse. Offered in even-numbered years.

**145. Bayesian Statistical Inference** (3) III. The Staff

Lecture—3 hours. Prerequisite: courses 130A-130B or 131A-131B-131C or the equivalent. Subjective probability, Bayes Theorem, conjugate priors, non-informative priors, decision theory, estimation, testing, prediction, empirical Bayes methods, Bayesian robustness, properties of Bayesian procedures, comparisons with classical procedures, approximation techniques, hierarchical Bayesian analysis, applications. Offered in odd-numbered years.

**192. Internship in Statistics** (1-12) I, II, III. The Staff

(Chairperson in charge) Internship—3-36 hours; term paper. Prerequisite: upper division standing and consent of instructor. Work experience in statistics. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff

(Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates**

(1-5) I, II, III. The Staff (Chairperson in charge) Prerequisite: consent of instructor. (P/NP grading only.)

**Graduate Courses**

**205. Statistical Methods for Research** (3) III. The Staff

Lecture—3 hours. Prerequisite: course 106 or the equivalent. Topics in experimental design include: Latin squares, Youden squares, balanced and partially balanced incomplete block designs, factorial experiments, confounded designs, split-plot designs, lattice designs, fractional factorial designs, repeated measurements designs, optimal designs based on various criteria, analysis of covariance.

**221. Biostatistics: Risk Analysis** (3) II. The Staff

Lecture—3 hours. Prerequisite: courses 131A and 131B; consent of instructor. Modern methodologies for scientific inference in bioassay and medical trials; low-dose extrapolation problems; retrospective studies; standardization of rates; clinical trials; cohort life tables.

**222. Biostatistics: Applied Stochastic Processes and Survival Analysis** (3) III. The Staff

Lecture—3 hours. Prerequisite: courses 131A and 131B, and consent of instructor; Mathematics 132A recommended. Brief review of Markov models and generating functions; epidemic models; spatial processes; Chapman-Kolmogorov equations; general illness-death (Fix-Neyman) model, failure-time models; survival analysis; covariate adjustment in survival studies; survival analysis with incomplete data.

**230. Brief Advanced Mathematical Statistics** (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 131A, 131B, 131C, and Mathematics 167, or their equivalent. Distribution theory, modes of convergence, laws of large numbers, central limit theorem, Slutsky's Theorem,  $\delta$ -method, consistency and

asymptotic normality of maximum likelihood estimates, method of scoring, hypotheses testing based on likelihood ratios, Pitman efficiency, concepts of decision theory, Bayesian inference. Students who have received credit for courses 231A, 231B, or 231C may receive only 2 units, 1 unit, or no credit respectively for course 230.

**231A-231B-231C. Mathematical Statistics (4-4) I-II-III. The Staff**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 131C and Mathematics 127A-127B or the equivalent. Distribution theory, decision theoretic methods, estimation and hypotheses testing, multivariate techniques, large sample theory.

**232A-232B. Linear Model Theory (4-4) I-II. The Staff**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 131C. Estimation and testing for the general linear hypothesis, components of variance, multiple comparisons.

**232C. Advanced Regression Analysis (3) III. The Staff**

Lecture—3 hours. Prerequisite: courses 108 and 130B or 131C, or consent of instructor. Techniques of variable selection; problems of multicollinearity; nonlinear regression. Special topics.

**233. Design of Experiments (3) III. The Staff**

Lecture—3 hours. Prerequisite: course 131C. Topics from balanced and partially balanced incomplete block designs, fractional factorials, and response surfaces. Offered in odd-numbered years.

**235A-235B-235C. Probability Theory (3-3-3) I, II, III. The Staff**

Lecture—3 hours. Prerequisite: Mathematics 127C and courses 131A-131B or the equivalent. Measure theoretic foundations, abstract integration, modes of convergence, limit theorems, independence, laws of large numbers, characteristic functions, central limit theorem, conditional expectations; topics from discrete time, Markov and stationary processes, ergodic theory, Brownian motion, weak convergence, Wiener and Poisson processes. (Same course as Mathematics 235A-235B-235C.)

**236A. Advanced Mathematical Statistics: Sequential Analysis (3) II. The Staff**

Lecture—3 hours. Prerequisite: course 231C. Sequential decision functions, Bayes and minimax rules, backward induction, sufficiency and invariance under sequential sampling, Wald SPRT and its optimality, continuous time SPRT, repeated significance tests, confidence intervals. Offered in odd-numbered years.

**236B. Advanced Mathematical Statistics: Non-parametric Theory (3) III. The Staff**

Lecture—3 hours. Prerequisite: courses 134 and 231C. Locally most powerful rank tests, asymptotic distribution theory under null hypothesis and under local alternatives, empirical process, Kolmogorov-Smirnov and Cramér-von Mises tests, representation of sample quantities, nonparametric density estimation and nonparametric regression. Offered in even-numbered years.

**237A. Time Series Analysis: Foundations (3) I. The Staff**

Lecture—3 hours. Prerequisite: course 131A or Mathematics 131 or the equivalent. Basic structure of stationary and non-stationary time series. Differentiation, integration, spectral representations, linear filtering, mean square estimation, the discrete Fourier transform, laws of large numbers, autoregressive moving average processes. Offered in odd-numbered years.

**237B. Time Series Analysis: Statistical Inference (3) II. The Staff**

Lecture—3 hours. Prerequisite: courses 131B-131C and 237A. Multivariate normal processes, spectral estimation, tests of hypotheses, regression, discrimination filtering, spectral analysis of variance, ARIMA processes, state space models, and maximum likelihood estimation. Offered in even-numbered years.

**238A. Theory of Multivariate Analysis I (3) II. The Staff**

Lecture—3 hours. Prerequisite: course 231C or

consent of instructor. Review of matrix algebra; Jacobians; standard multivariate normal distribution theory; multiple, partial, and canonical correlation; maximum likelihood estimation; properties of the Wishart distribution; Hotelling's  $T^2$  test; union intersection principle; simultaneous linear compounds; likelihood ratio testing procedure; multivariate regression analysis. Offered in odd-numbered years.

**238B. Theory of Multivariate Analysis II (3) III. The Staff**

Lecture—3 hours. Prerequisite: course 238A. Multivariate analysis of variance; profile analysis; growth curve analysis; principal component analysis; inferences on covariances; factor analysis. Classification and discrimination; distribution of characteristic roots. A Bayesian approach to multivariate analysis. Testing independence of sets of variates, canonical correlations, cluster analysis. Offered in odd-numbered years.

**250. Advanced Data Analysis (4) I. The Staff**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 141, 232A and either course 230 or 231A. Resampling methods and one to three additional topics selected from nonparametric and semi-parametric methods, incomplete data analysis, diagnostics, nonstandard multivariate and time series analysis, applied Bayesian methods, sequential analysis and quality control, categorical data analysis. Offered in even-numbered years.

**290. Seminar in Statistics (1-6) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: consent of instructor. Seminar on advanced topics in probability and statistics. (S/U grading only.)

**298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

**299. Individual Study (1-12) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: consent of instructor. (S/U grading only.)

**299D. Dissertation Research (1-12) I, II, III. The Staff**

Prerequisite: candidate for Ph.D. degree. Research in statistics under the supervision of major professor. (S/U grading only.)

**Professional Course**

**401. Methods in Statistical Consulting (3) I, II, III. The Staff**

Supervised consultation—3 hours. Prerequisite: graduate standing in Statistics. Students observe faculty consulting with clients and discuss with faculty methods of analyzing their data or of designing their experiments. Students may also perform data analysis. Following this, students do supervised, then unsupervised, but reviewed, statistical consulting. May be repeated once for credit. (S/U grading only.)

## Statistics (A Graduate Group)

George G. Roussas, Ph.D., Chairperson of the Group

Group Office, 469 Kerr Hall (916-752-2361)

**Faculty.** The Group has approximately thirty faculty members from all colleges, schools, and divisions, including fourteen from the Intercollege Division of Statistics.

**Graduate Study.** The Graduate Group in Statistics offers programs of study and research leading to the M.S. and Ph.D. degrees. For detailed information, see the *Graduate Announcement*, or contact the Chairperson of the Group.

**Graduate Adviser.** F.J. Samaniego.

## Subject A

See under University Requirements; and English A.

## Surgery

See Surgery (Medicine, School of); and Surgery (Veterinary Medicine), below

## Surgery

(School of Veterinary Medicine)

Eugene P. Steffey, V.M.D., Ph.D., Chairperson of the Department

Department Office, 2112 Medical Science 1A (916-752-3599)

**Faculty**

Cleta S. Bailey, D.V.M., Ph.D., Associate Professor

Roy W. Bellhorn, D.V.M., M.S., Professor

Eugene M. Breznock, D.V.M., Ph.D., Professor

Nedim C. Buyukmihci, V.M.D., Associate Professor

Robert M. Cello, D.V.M., Professor Emeritus

Ira M. Gourley, D.V.M., Ph.D., Professor

Clare R. Gregory, D.V.M., Assistant Professor

Steve C. Haskins, D.V.M., M.S., Professor

Susan V. Hildebrand, D.V.M., Associate Professor

Terrell A. Holiday, D.V.M., Ph.D., Professor

Janet E. Ilkiw, B.V.Sc., Ph.D., Assistant Professor

David N. Krag, M.D., Ph.D., Assistant Professor in Residence

Robert L. Leighton, V.M.D., Professor Emeritus

Robert L. Linford, D.V.M., Ph.D., Assistant Professor

Bruce R. Madewell, V.M.D., M.S., Professor

Dennis M. Meagher, D.V.M., Ph.D., Professor

Harold R. Parker, D.V.M., Ph.D., Professor Emeritus

John R. Pascoe, B.V.Sc., Ph.D., Associate Professor

Peter J. Pascoe, B.V.Sc., Ph.D., Assistant Professor

Eugene P. Steffey, V.M.D., Ph.D., Professor

Gordon H. Theilen, D.V.M., Professor

Philip B. Vasseur, D.V.M., Associate Professor

John D. Wheat, D.V.M., Professor

Alida P. Wind, M.V.D., Senior Lecturer

**Part-Time Clinical Faculty**

Gregory L. Ferraro, D.V.M., Associate Clinical Professor

Randall H. Scagliotti, D.V.M., Assistant Clinical Professor

Leigh West-Hyde, D.V.M., Assistant Clinical Professor

Pauline L. Wong, D.V.M., Lecturer

## Courses in Surgery

### Upper Division Course

**199. Special Study for Advanced Undergraduates (1-5) I, II, III. The Staff (Steffey in charge) (P/NP grading only.)**

**Graduate Courses**

**230. Principles of Anesthesia and Surgery for Investigators (2) II. Steffey, Gourley**

Lecture—2 hours. Prerequisite: graduate or professional student or consent of instructor. Presentation and integration of principles and techniques of anesthesia and surgery for laboratory animals. Course is not restricted to student numbers.

**230L. Principles of Anesthesia and Surgery for Investigators (2) II. Gourley, Steffey**

Discussion—1 hour. laboratory—4 hours. Prerequisite:

course 230 concurrently. Laboratory to complement course 230. Limited enrollment. (S/U grading only.)

**291. Anesthesia/Critical Care Basic Science Conference** (1) I, II, III. The Staff (P. Pascoe in charge) Discussion—1 hour. Prerequisite: postdoctoral, medical, or graduate student; consent of instructor. Advanced course in scientific foundations of animal anesthesia and critical care. Format is directed by discussion following reading of assigned material emphasizing foundations in pharmacology and physiology. (S/U grading only.)

**293. Anesthesia/Critical Care Case Management Conference** (1) I, II, III. The Staff (Wong in charge) Discussion—1 hour. Prerequisite: postdoctoral, medical or graduate student; consent of instructor. Discussion of Veterinary Medical Teaching Hospital case material to illustrate specific medical problems and their preventive and corrective management. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Steffey in charge)

**299. Research** (1-12) I, II, III. The Staff (S/U grading only.)

#### Professional Courses

**411. Small Animal Surgery** (1 1/2 per week) I, II, III. The Staff (Vasseur in charge)

Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for care of pet animal patients in the hospital including physical examinations, presurgical work-ups, surgery, postoperative care and follow-up under the supervision of the senior surgical staff. May be repeated for credit. (S/U grading only.)

**412. Large Animal Surgery** (1 1/2 per week) I, II, III. The Staff (Meagher in charge)

Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for care of farm animal surgical patients in the hospital and outpatient clinic including physical examinations, presurgical work-up, assistance at operations, surgery, post-surgical care and follow-up under the supervision of the senior surgical staff. May be repeated for credit. (S/U grading only.)

**414. Veterinary Anesthesiology** (1 1/2 per week) I, II, III. The Staff (Steffey in charge)

Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for anesthetic care of patients in the operating rooms under the supervision of the senior staff. May be repeated for credit. (S/U grading only.)

**420. Veterinary Neurology** (1 1/2 per week) I, II, III. Holiday

Laboratory—50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for care of hospital and outpatients including history taking, neurologic examinations and special diagnostic and therapeutic procedures under the direction of the staff neurologist. (S/U grading only.)

**422. Veterinary Ophthalmology** (3/4-1 1/2 per week) I, II, III. Buyukmihci

Laboratory—25-50 hours. Prerequisite: professional standing, House Officer in Veterinary Medical Teaching Hospital, or consent of instructor. House Officers responsible for the care of animals in the hospital and out-patient clinic including history taking, ophthalmologic examinations, special diagnostic techniques, assistance at ophthalmologic surgery and medical and post surgical care under the direction of the staff ophthalmologist. May be repeated for credit. (S/U grading only.)

**492. Large Animal Grand Rounds** (1/2) I, II, III. The Staff (Meagher in charge)

Discussion—1 hour. Prerequisite: professional standing; House Officer in Veterinary Medical Teaching Hospital or consent of instructor. House Officers take an active part in the presentation and discussion of

selected cases from the large animal and ambulatory clinics. (S/U grading only.)

## Swedish

### See Scandinavian

## Textile Science

### See Fiber and Polymer Science

## Textiles (A Graduate Group)

S. Haig Zeronian, Ph.D., D.Sc., Chairperson of the Group

Group Office, 129 Everson Hall (916-752-6650)

**Faculty.** The Group includes the faculty from the Division of Textiles and Clothing as well as from a variety of other departments representing related disciplinary fields.

**Graduate Study.** The Graduate Group in Textiles offers a program of study and research leading to the M.S. degree. For detailed information regarding the program, address the Chairperson of the Group.

**Graduate Adviser.** S. H. Zeronian (Textiles and Clothing).

## Textiles and Clothing

(College of Agricultural and Environmental Sciences)

Margaret H. Rucker, Ph.D., Chairperson of the Division

Division Office, 129 Everson Hall (916-752-6650)

### Faculty

You-Lo Hsieh, Ph.D., Associate Professor

2 Susan B. Kaiser, Ph.D., Associate Professor

Mary Ann Morris, Ph.D., Professor Emeritus

3,4 Howard L. Needles, Ph.D., Professor

Margaret H. Rucker, Ph.D., Professor

1 Howard G. Schultz, Ph.D., Professor

S. Haig Zeronian, Ph.D., D.Sc., Professor

### The Major Program

The Textiles and Clothing major is concerned with the study of textile products. Integrative product and process knowledge are stressed in relation to the production, distribution, and consumer use of textiles and apparel. Within the Textiles and Clothing major there are two options that share preparatory subject matter course work in textiles and clothing, as well as in the social sciences-humanities and the physical sciences.

The **Multidisciplinary** option provides students with a broad knowledge base in both the physical and the social sciences, as relevant to the study of textiles and clothing. This base includes (a) physical and chemical properties of textiles, (b) production, end-use applications, and care of textiles, (c) apparel structures and production, and (d) social-psychological and economic aspects of textiles and clothing. Students pursuing this option are expected to have a particular area of emphasis in textiles through careful selection of restricted electives in consultation with an adviser. The option prepares students for

(a) advanced studies in textiles and clothing, or related fields in the physical and social sciences, or (b) careers in textiles and clothing such as production, testing, quality control, technical service, marketing, textile journalism, and design. Those students interested in careers in extension service and teaching should consult with their adviser.

The **Marketing** option involves an emphasis in social science and business course work, while also providing students with an awareness of the physical nature of textile products. This option prepares students for (a) careers in marketing, management, and merchandising, as well as for (b) advanced studies in textiles and clothing with emphasis in the social-psychological or economic aspects, in marketing or administration, or in consumer behavior.

### B.S. Major Requirements:

(For convenience in program planning the *usual* courses taken to satisfy the requirements are shown in parentheses. Equivalent or more comprehensive courses are acceptable.) Courses shown without parentheses are required.

	UNITS
<b>Written/Oral Expression</b> .....	8
See College requirement.....	8
<b>Preparatory Subject Matter</b> .....	39-41
Computer science (Agricultural Science and Management 21, Computer Science Engineering 10, or Sociology 40) .....	2-3
Economic principles (Economics 1A-1B).....	10
History of art or cultural anthropology (Anthropology 2, Art 10H) .....	4
Physics (Physics 10 or Physics 1A).....	3-4
Psychology (Psychology 1).....	4
Sociology (Sociology 2) .....	4
Statistics (Statistics 13) .....	4
Textiles and Clothing (Textiles and Clothing 6, 8) .....	8
<b>Option-Specific Preparatory Subject Matter</b> .....	16-18
<b>Marketing Option</b> .....	18
Accounting (Economics 11A-11B) ...8	8
Chemistry (Chemistry 10) .....	4
Mathematics (Mathematics 16A-16B).....	6
<b>OR</b>	
<b>Multidisciplinary Option</b> .....	16
Chemistry (Chemistry 1A, 1B, 8A, 8B).....	16
<b>Breadth/General Education</b> .....	6-24
Satisfaction of General Education requirement	
<b>Marketing Option Depth Subject Matter</b> .....	54
Agricultural economics (Agricultural Economics 100A-100B, 106, 136) .....	16
Social research methods (Sociology 46A or Psychology 41) .....	4
Statistics (Statistics 103) .....	4
Psychology (Psychology 145 or 183) .....	4
Textiles and clothing (Textiles and Clothing 107, 110, 162, 162L, 163, 163L, 164, 173, 174, 177) .....	26
<b>Multidisciplinary Option Depth Subject Matter</b> .....	43
Agricultural Economics (Agricultural Economics 112, 113) .....	8
Design (Design 143) .....	4
Psychology (Psychology 145 or 183) .....	4
Textiles and clothing (Textiles and Clothing 107, 161, 161L, 162, 162L, 163, 163L, 164, 173, 174, 177) .....	27
<b>Marketing Option Restricted Electives</b> .....	15
Courses selected from the following:	
Agricultural Economics 18, 112, 141M, 142, 155, 157, 171A, 171B, Anthropology 122, 126, Consumer Science 100, Design 143, Economics 101, 121A, 121B, 134, 162, and other relevant	

course work, Foreign language, a maximum of 15 units, Mathematics 16C, Psychology 145, 183, Sociology 123, 126, 140, 141, 145, Textiles and Clothing 170, 180A, 180B, 220, 230, with consent of instructor, and a maximum of 5 units in either Textiles and Clothing 192 or 199.

**Multidisciplinary Option Restricted Electives** ..... 24

Courses selected from the following: Agricultural Economics 18, 141, 141M, 142, 155, 171A, 171B, Agricultural Science and Management 150, Applied Behavioral Sciences 162, Chemistry 1C, 128A, 128B, 128C, Consumer Science 100, Design 142A, 142B, 160A, 160B, 160C, 170A, 170B, 170C, Economics 11A, 11B, 100, 101, 121A, 121B, 134, Foreign Language, a maximum of 15 units, Mathematics 16A, 16B, 16C, Psychology 145, 183, Rhetoric and Communication 42, 130, 136, 140, Sociology 25, 123, 126, 140, 148, 159, 175, Statistics 106, 108; Textiles and Clothing 100, 170, 180A, 180B, 220, 230, with consent of instructor, and a maximum of 5 units in either Textiles and Clothing 192 or 199.

**Marketing Option Unrestricted Electives** ... 15-41

**Multidisciplinary Option Unrestricted Electives** ..... 22-50

**Total Units for the Degree** ..... 180

**Major Adviser.** S.H. Zeronian

**Advising Center** for the major is located in 129 Everson Hall (916-752-4417).

**The Minor Program:**

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 129 Everson Hall.

UNITS

**Textiles and Clothing** ..... 18

One course from Textiles and Clothing 6, 8 ..... 4

Courses selected from Textiles and Clothing 107, 110, 161-161L, 162-162L, 163-163L, 164, 170, 173, 174, 177 ..... 14

**Minor Adviser.** S.H. Zeronian.

**Graduate Study.** A program of study is offered leading to the M.S. degree in Textiles. Information can be obtained from the graduate adviser, S.H. Zeronian. Also see the Graduate Division section in this catalog.

**Related Courses.** See courses in Consumer Science and Design.

**Courses in Textiles and Clothing**

Questions pertaining to the following courses should be directed to the instructor or to the Division of Textiles and Clothing.

**Lower Division Courses**

**6. Introduction to Textiles** (4) III. The Staff  
Lecture—3 hours; laboratory—3 hours. Introduction to the structure and properties of textiles. Consumer use and fabric characteristics are emphasized. (CAN H Ec 6)

**8. The Textile and Apparel Industries** (4) I. Rucker  
Lecture—4 hours. Study of the textile and apparel industries including fashion theory, production, distribution, and consumption of textile goods.

**92. Internship in Textiles and Clothing** (1-12) I, II, III. The Staff Rucker in charge  
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.)

**98. Directed Group Study** (1-5) I, II, III. The Staff Rucker in charge  
Prerequisite: consent of instructor. (P/NP grading only.)

**99. Special Study for Lower Division Students** (1-5) I, II, III. The Staff (Rucker in charge)  
(P/NP grading only.)

**Upper Division Courses**

**100. Principles of Polymer Materials Science** (3) II. Zeronian

Lecture—3 hours. Prerequisite: Chemistry 1A-1B or 4A-4B 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 Engineering 147.)

**107. Social and Psychological Aspects of Clothing** (4) III. Kaiser

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. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: Anthropology 2 or Sociology 2.

**110. Synthetic Fibers and Plastics in Society** (3) I. Needles

Lecture—3 hours. Prerequisite: Chemistry 10 or a course in the physical sciences. Basic concepts and methodologies in study of synthetic fibers and plastics. Fiber and plastic formation, classification, structure, properties, processing, formulation, and applications. Impact of fibers and plastics on society and the environment. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Chemistry 10 or introductory course in physical sciences.

**150. Polymer Syntheses and Reactions** (3) III. Hsieh

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.

**161. Structure and Properties of Fibers** (3) I. Zeronian

Lecture—3 hours. Prerequisite: course 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.

**161L. Textile Chemical Analysis Laboratory** (1) I. Zeronian

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.

**162. Textile Fabrics** (3) II. The Staff

Lecture—3 hours. Prerequisite: course 6. Properties of fabrics as related to serviceability, comfort, and appearance.

**162L. Textile Fabrics Laboratory** (1) II. The Staff

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.

**163. Textile Coloration and Finishing** (3) I. Needles

Lecture—3 hours. Prerequisite: course 6, 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.

**163L. Textile Coloration and Finishing Laboratory**

(1) I. Needles

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.

**164. Principles of Apparel Production** (3) III. Hsieh  
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.

**170. Advanced Clothing Structure** (5) I. The Staff  
Lecture—3 hours; laboratory—6 hours. Prerequisite: course 6 and either course 8 or 107; clothing construction skills required. Introduction of drafting, flat pattern and draping principles for deriving two-dimensional patterns for three-dimensional clothing structures. In-depth studies of the interrelationships and the combined applications of clothing structure principles. Analytical and experimental approaches are emphasized for structural development.

**173. Principles of Fashion Marketing** (3) II. Rucker  
Lecture—3 hours. Prerequisite: course 8, Economics 1A, Agricultural Economics 113 or 136. Study of basic elements of fashion marketing including philosophy and objectives, organization merchandising, pricing, promotion and personnel.

**174. Introduction to World Trade in Textiles and Clothing** (2) II. Rucker

Lecture—2 hours. 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.

**177. Clothing and Social Perception** (3) I. Kaiser

Lecture—3 hours. Prerequisite: course 107; Sociology 2; Psychology 1: Social and cognitive processes related to the meanings people assign to clothing cues when perceiving one another. Particular attention to the following appearance-related stereotypes: age, sex, physical attractiveness, status, ethnicity. Influences of clothing and appearance on social interactions.

**180A-180B. Introduction to Research in Textiles**

(2-2) I, II, III. The Staff (Rucker in charge)  
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.)

**192. Internship in Textiles and Clothing** (1-12) I, II, III. The Staff (Rucker in charge)

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) I, II,

III. The Staff (Rucker in charge)  
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) I, II, III. The Staff (Rucker in charge)  
(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Rucker in charge)  
(P/NP grading only.)

**Graduate Courses**

**220. Textile Product Quality and Standards** (3) II.

Zeronian  
Lecture—3 hours. Prerequisite: course 161. Principles involved in establishing standards for implementation of government laws and regulations concerning textiles and clothing and quality controls for textile products. Offered in even-numbered years.

**230. Behavioral Science Concepts in Textiles (3)**

III. Kaiser

Lecture—3 hours. Prerequisite: course 107, upper division or graduate course in statistics (e.g., Agricultural Science and Management 150) 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 odd-numbered years.

**250A-F. Special Topics in Polymer and Fiber Science (3)** II. Zeronian

Lecture—3 hours. Prerequisite: course 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).

**290. Seminar (1)** I, II. Rucker

Seminar—1 hour. Critical review of selected topics of current interest in textiles. (S/U grading only.)

**290C. Research Conference (1)** I, II, III. The Staff (Rucker in charge)

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.)

**293. Recent Advances in Textiles (3)** I. The Staff (Zeronian in charge)

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.

**298. Group Study (1-5)** I, II, III. The Staff (Rucker in charge)

**299. Research (1-12)** I, II, III. The Staff (Rucker in charge) (S/U grading only.)

Mikal E. Saltveit, Jr., Ph.D., Associate Professor

Carol Shennan, Ph.D., Assistant Professor

Paul G. Smith, Ph.D., Professor Emeritus

Arthur R. Spurr, Ph.D., Professor Emeritus

Herman Timm, Ph.D., Lecturer

Ronald E. Voss, Ph.D., Lecturer

James E. Welch, Ph.D., Lecturer Emeritus

Masatoshi Yamaguchi, Ph.D., Professor Emeritus

Shang Fa Yang, Ph.D., Professor

John I. Yoder, Ph.D., Assistant Professor

John I. Yoder, Ph.D., Assistant Professor

**Graduate Study.** A program of study is offered leading to the M.S. degree in Vegetable Crops. Information can be obtained from the graduate adviser. Also see the Graduate Division section in this catalog.

**Graduate Adviser.** A.B. Bennett.

**Related Courses.** See Plant Science 2, 101, 102, 112, 112L, 113, 221A, 221B.

**Courses in Vegetable Crops**

Questions pertaining to the following courses should be directed to the instructor or to the Advising Office, 137 Hunt Hall.

**Lower Division Course****92. Internship in Vegetable Crops (1-6)** I, II, III. The Staff (Department Chairperson in charge)

Laboratory—3-36 hours. Work-learn experience off or on campus in all subject areas pertaining to vegetable crops. Internships supervised by a member of the faculty. Maximum of 12 units permitted in the Vegetable Crops 92-192 series. (P/NP grading only.)

**Upper Division Courses****101. Principles of Vegetable Crops Production (4)** II. Jones

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1C and/or Plant Science 2. Fundamentals of vegetable crop production, handling, processing, utilization and distribution.

**105. Vegetable Biology, Evolution, and Systematics (4)** I. Yoder

Lecture—2 hours; laboratory—6 hours; field trip(s) and written and oral reports. Prerequisite: Biological Sciences 1C; Botany 108 recommended. Taxonomic and horticultural classification of the more important vegetable cultivars, their origin, morphology, nomenclature, and description; wild vegetable species, minor and exotic vegetables, and trends in development of new cultivars.

**118. Seed Production, Technology, and Physiology (4)** III. Bradford

Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 112; Genetics 100 or Plant Science 113 recommended. Principles of crop seed production, storage, and utilization. Physiological, developmental, genetic, and environmental factors influencing seed quality. Biological and technological aspects of crop establishment from seeds. Laboratory sessions include field trips to seed industry facilities.

**150. Vegetables in World Food Production Systems (4)** II. Shennan

Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Science 2 or Biological Sciences 1C; course 101 recommended. World food production, evaluation of cropping systems and priorities for agricultural research. Examination of selected systems in tropical, subtropical, arid and temperate regions, emphasizing usage, cultural practices, handling, nutritional importance and current research goals for significant vegetable crops.

**180. Topics in Plant Science Research (1)** I, II.

The Staff

Discussion—1 hour. Prerequisite: undergraduate standing in the plant or biological sciences. Discussion and critique of current research by faculty, graduate students, and undergraduate students. May be repeated for a maximum of 3 units. (P/NP grading only.)

**191. Undergraduate Research: Proposal (3)** I. The Staff

Lecture—1 hour; discussion—1 hour; independent study—3 hours. Prerequisite: upper division standing and consent of instructor. Faculty sponsor will indi-

vidually assist each student to define a problem, conduct a literature survey, identify objectives, generate testable hypotheses, design experiments, plan data analysis, prepare a working outline, and write and revise a draft proposal. (P/NP grading only.)

**191L. Undergraduate Research: Experiment (1-5)**

I, II, III. The Staff

Laboratory—3 to 15 hours. Prerequisite: course 191 (may be taken concurrently) and consent of instructor. Experimental testing of the hypothesis developed in course 191. May be repeated for credit. (P/NP grading only.)

**192. Internship in Vegetable Crops (1-12)** I, II, III.

The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: consent of instructor. Work-learn experience off or on campus in all subject areas pertaining to vegetable crops. Internships supervised by a member of the faculty. Maximum of 12 units permitted in the Vegetable Crops 92-192 series. (P/NP grading only.)

**194H. Senior Honors Thesis (1)** I, II, III. The Staff (Independent study—3 hours. Prerequisite: course 191L and consent of chairperson. Preparation and submission of honors thesis and presentation of the results in a seminar. (P/NP grading only.)**195. Field Study of Vegetable Industry (1)** III. Jackson

Field Study. Prerequisite: consent of instructor. Field study illustrating different aspects of California agriculture, including research institutions, farm operations, field stations, Extension Service, marketing, processors, equipment, etc. To be given between winter and spring quarters. Considered a spring course for preenrollment. (P/NP grading only.)

**197T. Tutoring in Vegetable Crops (1-3)** I, II, III. The Staff (Chairperson in charge)

Laboratory—3-9 hours. Prerequisite: consent of instructor. Voluntary tutoring for upper division students who desire teaching experience. Under supervision students may prepare laboratory materials, experiments, and autotutorial modules, conduct discussions and demonstrations, and be involved in testing. May be repeated up to a total of 6 units. (P/NP grading only.)

**198. Directed Group Study (1-5)** I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)**199. Special Study for Advanced Undergraduates (1-5)** I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)**Graduate Courses****212. Postharvest Physiology of Vegetables (4)** III.

Saltveit and Yang

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 112 or Plant Science 112. Comparative physiology of harvested vegetables; emphasis on maturation, senescence, compositional changes, physiological disorders and effects of environmental factors. Laboratories stress concepts and research procedures. Offered in even-numbered years.

**220. Biotechnology and Genetics of Crop Improvement (3)** I. Michelmore

Lecture—3 hours. Prerequisite: Genetics 100, Plant Science 113; Genetics 102A, 102B recommended. Emphasizes the integration of modern biotechnology and classical plant breeding including: transposable elements, genetic mapping, gene identification, transformation, tissue culture, incompatibility mechanisms, male sterility, gametophyte selection, disease and stress resistance.

**220L. Biotechnology and Genetics of Crop Improvement Laboratory (1)** I. Michelmore

Laboratory—3 hours. Prerequisite: course 220 concurrently. Several class projects in plant genetics and biotechnology: tomato genetics, isozyme segregation, *Agrobacterium* mediated plant transformation, self-incompatibility in *Brassica* species, mapping disease resistant genes.

**221. Genetics and Cytogenetics of Vegetable Crops (3)** III. Quiros

Lecture—3 hours. Prerequisite: Plant Science 113 or the equivalent. Genetics and cytogenetics of the

**Urology****See Medicine, School of****Vegetable Crops**

(College of Agricultural and Environmental Sciences)

Shang Fa Yang, Ph.D., Acting Chairperson of the Department

Department Office, 152 Hunt Hall (916-752-0516)

**Faculty**

Alan B. Bennett, Ph.D., Associate Professor

Arnold J. Bloom, Ph.D., Associate Professor

Kent J. Bradford, Ph.D., Associate Professor

Marita Cantwell, Ph.D., Lecturer

James F. Harrington, Ph.D., Professor Emeritus

Frederick D. Howard, Ph.D., Senior Lecturer Emeritus

Louise E. Jackson, Ph.D., Assistant Professor

Richard A. Jones, Ph.D., Professor

Oscar A. Lorenz, Ph.D., Professor Emeritus

James M. Lyons, Ph.D., Professor

Richard W. Michelmore, Ph.D., Associate Professor

Leonard L. Morris, Ph.D., Professor Emeritus

Donald J. Nevins, Ph.D., Professor

Harlan K. Pratt, Ph.D., Professor Emeritus

Carlos F. Quirós, Ph.D., Associate Professor

Lawrence Rappaport, Ph.D., Professor

Charles M. Rick, Ph.D., Professor Emeritus

Vincent Rubatzky, Ph.D., Lecturer

Dina St. Clair, Ph.D., Assistant Professor

NOTE: For key to footnote symbols, see page 133.

principal vegetables on a crop by crop basis. Current advances on the cytogenetic technology, sources of germplasm and applications to practical breeding problems.

**221L. Genetics and Cytogenetics of Vegetable Crops Laboratory (2) III. Quiros**

Laboratory—6 hours. Prerequisite: course 221 (may be taken concurrently). Genetic and cytogenetic techniques applicable to vegetables. Includes chromosome squash preparations for pachytene analysis, segregation and linkage analysis of quantitative traits in interspecific hybrids, gene-centromere mapping, and aneuploid segregations.

**225. Transposable Elements in Higher Plants (3)**

II. Yoder

Lecture—1 1/2 hours; discussion—1 1/2 hours. Prerequisite: graduate standing or consent of instructor. Examines both the classical and molecular genetic information about plant transposable elements. Topics include the discovery, molecular structure, evolutionary significance and practical uses of these fascinating genetic entities. Offered in even-numbered years.

**228. Plant Molecular Biology Laboratory (4) II.**

Bennett, Harada (Botany)

Lecture—1 hour; laboratory—10 hours. Prerequisite: Biochemistry 101L, a course in molecular genetics, and consent of instructors; Botany 227 recommended. Research methods in plant molecular biology. Topics include analysis of gene expression, characterization of gene structure, and gene transfer technology. Emphasis will be placed on analysis of developmentally regulated gene expression.

**230. Selected Methods in Vegetable Research (3)**

II. Bennett

Lecture—1 hour; laboratory—6 hours. Prerequisite: one course from Plant Science 102, Botany 111, 112, Biochemistry 101A-101B or 101L. Survey of the theory and practice of certain laboratory methods and techniques used in vegetable/plant research, with emphasis on determination of plant constituents, physiological functions, and cell/tissue culture. Offered in odd-numbered years.

**290. Seminar (1) I, II, III. The Staff**

Discussion—1 hour. (S/U grading only.)

**291. Special Topics in Vegetable Crops (2) I.**

Rappaport

Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing. In-depth coverage of selected topics in vegetable crops and related disciplines. Topics and speakers determined by instructor in charge. Assignments include brief evaluation of a lecture, and pertinent narrative or grant proposal. May be repeated for credit. (S/U grading only.)

**298. Group Study (1-5) I, II, III. The Staff (Chairperson in charge)**

Prerequisite: consent of instructor.

**299. Research (1-12) I, II, III. The Staff (Chairperson in charge)**

(S/U grading only.)

**Professional Course**

**300. Tutoring in Vegetable Crops (1-3) I, II, III. The Staff (Chairperson in charge)**

Tutoring—3-9 hours. Prerequisite: consent of instructor. Voluntary tutoring for graduate students who desire teaching experience, but who are not teaching assistants. Students under supervision may give lectures, prepare laboratory materials, experiments, and autotutorial modules, conduct discussions and demonstrations, and be involved in testing. May be repeated for a total of 6 units. (S/U grading only.)

## **Veterinary Medicine, School of**

Edward A. Rhode, D.V.M., Dean of the School

George H. Cardinet III, D.V.M., Ph.D., Associate Dean—Instruction

Bennie I. Osburn, D.V.M., Ph.D., Associate Dean—Research

Donald G. Low, D.V.M., Ph.D., Associate Dean—Public Programs

Robert J. Hansen, Ph.D., Associate Dean—Student Services

William J. Winchester, D.V.M., Assistant Dean  
School Office, 1018 Haring Hall (916-752-1360)

### **Courses in Veterinary Medicine**

#### **Upper Division Course**

**192. Work-Learn Experience in Veterinary Science (1-12) I, II, III, IV. Cardinet**

Discussion-laboratory and clinic—3-36 hours; final report. Prerequisite: upper division standing; approval of project prior to period of internship by preceptor. Supervised work experience in Veterinary Medicine. (P/NP grading only.)

**Professional Courses**

**400. Informatics (1.0) I. Cardinet**

Discussion—2 hours; laboratory—8 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine.† Acquisition of elementary skills and proficiency in the use of microcomputing will be achieved through the "real time" use of microcomputers within the science laboratories of instruction. (S/U grading only.)

**401. Microscopic and Gross Veterinary Anatomy (10.4) I-II. Hyde**

Lecture—54 hours; laboratory—50 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine.† Normal interrelationships of structure and function through an integrated presentation of molecular, cellular, tissue, organ, and whole animal structure; principles of developmental biology and organogenesis, and comparative structure of animals and their organ systems. (Deferred grading only, pending completion of two-quarter sequence.)

**402A. Systemic Physiology: Gastrointestinal and Cardiovascular Systems (2.9) I. Bruss**

Lecture—22 hours; laboratory—7 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine.† Basic principles of normal physiologic function in the vertebrate gastrointestinal and cardiovascular systems. These principles are essential for understanding of disorders of the gastrointestinal and cardiovascular systems.

**402B. Systemic Physiology: Urinary System and Body Fluids (1.7) II. Bruss**

Lecture—12 hours; laboratory—5 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine.† Provides an understanding of the various functions of the kidney and the urinary system; body fluids and acid-base physiology and mammary physiology.

**402C. Systemic Physiology: Respiratory System (1.8) II. Jones**

Lecture—12 hours; laboratory—6 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine.† Provides a basic understanding of normal physiological function of the vertebrate respiratory system.

**403. Physiological Chemistry (6.6) I. Black**

Lecture—57 hours; laboratory—9 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine.† Emphasizes biochemical concepts used to analyze problems and evaluate metabolic relationships important in animal health and disease.

**403B. Pharmacology (2.3) I. Giri**

Lecture—21 hours; laboratory-demonstration—2

three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Mechanisms and effects of drugs on various organ systems from a comparative, animal-oriented viewpoint. Laboratories are designed to demonstrate the application of such material to therapeutics.

**404. Fundamentals of Radiography (2.7) II. Morgan**

Lecture—23 hours; laboratory—4 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Ionizing radiation and its interaction with matter and biological systems; instrumentation and principles of diagnostic radiology, radiotherapy and nuclear medicine; diagnostic applications of x-rays and basic principles of veterinary radiology.

**405. Veterinary Parasitology (3.6) III. Conrad, Boyce**

Lecture—26 hours; laboratory—10 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine.† Provides an understanding of the important biological and clinical aspects of parasites and the disease they cause in animals.

**405B. Clinical Parasitology (3) III. Boyce**

Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor.† Ecology, pathology, diagnosis, and therapy of the more important parasites of domestic animals.

**406. Principles of Behavior (0.7) I. Hart**

Lecture—7 hours. Prerequisite: first year standing in the School of Veterinary Medicine.† Overview of animal behavior with relevance to veterinary medicine.

**407A. Principles of Surgery (1) III. Vasseur**

Lecture—9 hours; laboratory—1 three-hour session. Prerequisite: second-year standing in School of Veterinary Medicine. Concept of total patient care will be developed and applied to patient undergoing surgical management. Current principles of surgical physiology emphasized.

**407B. Principles and Techniques of Surgery (2) I. Gourley**

Lecture—9 hours; laboratory—9 three-hour sessions; discussion—3 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Continuation of course 407A. Introduces the veterinary student to technical aspects of surgical science. Specific operative procedures performed by the student provide opportunity to learn fundamental skills of asepsis, instrument identification and manipulation, knot tying, hemostasis and tissue dissection.

**407C. Surgical Anatomy (1) I. Stover**

Laboratory—10 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Study of anatomical topics as applied to selected surgical operations. Topographical features useful to approaching organs and structures described. Tissues and structures basic to surgery emphasized.

**408. Nutrition and Nutritional Diseases in Animals (2.9) II. Morris**

Lecture—27 hours; laboratory—2 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine.† Principles of nutrition and their application to the solution of nutritional disorders of animals.

**409. Epidemiology (1.7) III. Gardner**

Lecture—11 hours; discussion—6 hours. Prerequisite: first-year standing in School of Veterinary Medicine.† Introduction to epidemiology and its applications in veterinary medicine.

**410. Veterinary Toxicology (2.8) III. Mount**

Lecture—28 hours. Prerequisite: third-year standing in School of Veterinary Medicine.† Diseases of animals produced by chemical poisons, organic and inorganic. The prevalence of toxic agents in the environment and exposure of animals to them; the incidence, pathology, pathogenesis, diagnosis and treatment of diseases produced by poisons will be discussed.

**411A. Laboratory Animal Medicine (2) II. Brooks**

Lecture—20 hours. Prerequisite: third-year standing

in School of Veterinary Medicine or consent of instructor. Diagnostic, therapeutic and preventive methods for diseases of rabbits, guinea pigs, hamsters and certain related laboratory rodents will be presented to serve the needs of clinical and research veterinarians. Lecture demonstrations with subject species will be provided.

**412. Laboratory Animal Medicine** (2) III. Brooks  
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Prevention, diagnosis and therapy of medical problems in rabbits, guinea pigs, hamsters, mice, rats and other laboratory species. Emphasis will be placed on animal colony health management technique, and concepts of preventive disease needed by veterinarians in charge of research facilities.

**413. Medical Primatology** (2) III. Roberts  
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Major diseases, medical management and husbandry of captive nonhuman primates. (S/U grading only.)

**415. Management and Disease of Captive Wildlife** (2) III. Fowler  
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Lectures, demonstrations, and discussions used to illustrate selected medical problems of captive wild animals.

**416. Aquatic Animal Medicine** (2) III. Hedrick  
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Etiology, pathology, diagnosis, treatment and prevention of diseases of fish and of some aquatic arthropods and mammals. Preventive management of diseases in aquaculture.

**417. Cage Bird Medicine** (2) II. Ramsay  
Lecture—20 hours. Prerequisite: third-year veterinary medical student or consent of instructor. Medical and surgical problems of caged birds; handling and restraint, feeding, nutritional and infectious diseases, anesthesia and surgery, plus problems of organ systems.

**418. Diseases of Free Living Wildlife** (2) II. Fowler  
Discussion—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Lectures on the ecology and epidemiology of disease in free-living wild animals including medical management of free-living populations.

**419. Virology** (2.7) III. Zee, Yilmaz  
Lecture—19 hours; laboratory—8 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine.† Introduction to the classification, morphology, and the strategy of replication of animal viruses, covering the molecular pathogenesis of animal viruses at the cellular level with emphasis on agents of infectious diseases of animals.

**420. Immunology** (3.0) III. Gershwin  
Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine.† Concepts of immunology. Emphasis is on the principles of vaccination, responses to pathogenic agents, and the development of hypersensitivity and autoimmune reactions.

**420B. Musculoskeletal System-Abnormal Functions** (4.5) III. Wind  
Lecture—38 hours; laboratory—7 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine.† Abnormal function of the musculoskeletal system and diseases affecting the musculoskeletal system in animals. The manifestations, pathology, pathogenesis, diagnosis and medical and surgical treatments of musculoskeletal disease will be discussed.

**421. Principles of Neurosciences** (2.7) II. Hyde  
Lecture—22 hours; laboratory—5 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine.† An integrated study of normal neurobiology, neuroanatomy, and neurophysiology, to enable students to engage in studies of neurologic disorders and clinical neurology.

**421B. Neurology-Abnormal** (3.5) III. Holliday, Bailey  
Lecture—28 hours; laboratories—7 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine.† Abnormal function of the nervous system and diseases affecting the nervous system in animals. Manifestations of diseases, pathology, pathogenesis, diagnosis and medical and surgical treatments of neurologic diseases will be discussed.

**422. Veterinary Ophthalmology** (2.5) II. Bellhorn  
Lecture—21 hours; laboratory—4 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine.† Normal structure and function of the eye and the response of the eye to disease. All species of domestic animals will be included. Discussion of selected ocular diseases of various species.

**423. Small Animal Ophthalmology** (2) III. Buyukmichi  
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Diagnosis and treatment of commonly encountered eye diseases of small animals and non-domestic animals.

**424. Current Topics in Veterinary Oncology** (1) III. Theilen, Madewell  
Lecture—10 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor.† Fundamentals of oncology for veterinary students with objectives of clinical practice, research or academic careers. Topics will include etiology, diagnosis, and treatment of cancer in domestic animals.

**425B. Pulmonary Medicine** (2.9) I. George  
Lecture—23 hours; laboratory—6 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Provide basic understanding of nature, causes, clinical expression, diagnosis and treatment of the important respiratory diseases of dogs, cats, horses, and food animals.

**425C. Cardiovascular Medicine** (2.6) I. Thomas  
Lecture—21 hours; laboratory—5 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Principles of cardiovascular medicine (pathophysiology, diagnosis, and treatment) in animals.

**425D. Urinary System, Abnormal** (2.5) II. Cowgill  
Lecture—20 hours; laboratory—5 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Abnormal function of urinary system and diseases affecting this system in animals. Manifestations, pathogenesis, pathophysiology, pathology, diagnosis and medical and surgical treatment of urinary system discussed.

**426. Principles of Anesthesiology** (1.7) III. Steffey  
Lecture—15 hours; laboratory—2 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. Basic principles of veterinary anesthesiology including the techniques, monitoring, and management of anesthesia in animal patients, the clinical use of anesthetic drugs and anesthetic equipment.

**427. Equine Internal Medicine** (3) III. Madigan  
Lecture—30 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Advanced equine medical diseases including sections on general medicine, respiratory and gastrointestinal diseases, cardiology, dermatology, neurology, oncology, and ophthalmology.

**428. Food Animal Surgery** (1.6) III. Smith  
Lecture—16 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Selected topics in surgical diseases of food animals covered in detail. (S/U grading only.)

**428L. Food Animal Surgery Laboratory** (0.7) III. Smith  
Laboratory—7 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine; course 428 (concurrently). Representative surgeries

of food animals performed by groups of students. Limited enrollment. (S/U grading only.)

**429A. Herd Health Management of Beef, Cattle, Swine, Sheep, and Goats** (4) II. Hjerpe  
Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Practical systems for delivering veterinary service to feedlot, cow-calf, stocker, swine, sheep, and goat production units are considered, with emphasis on prevention and control of disease.

**429B. Dairy Herd Health Management** (4) III. Weaver  
Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor.† Practical systems for delivering veterinary services to dairy farms with emphasis on disease prevention and production control. Lectures supplemented with visits to dairy farms to evaluate feeding programs and health management.

**430. Principles of Radiology and Radiographic Anatomy** (3.0) I, II, III. Hornof  
Lecture—26 hours; laboratory—4 three-hour sessions. Prerequisite: first year standing in the School of Veterinary Medicine.† Physical principles of x-ray production and x-ray/matter interactions as they pertain to diagnostic medical imaging and radiation safety and normal radiographic anatomy of the skeleton, head, thorax, and abdomen. (Deferred grading only, pending completion of two-quarter sequence.)

**430B. Gastrointestinal Diseases of Small Animals** (2.5) II. Strombeck  
Lecture—25 hours. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor.† Abnormal function of digestive system and diseases affecting digestive system in small animals. Manifestations, pathology, pathogenesis, diagnosis including special diagnostic procedures, and medical and surgical treatments of gastrointestinal disease including diseases of the liver and pancreas.

**430C. Gastrointestinal Diseases of Large Animals** (2.5) III. Smith  
Lecture—25 hours. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor.† Abnormal function of digestive system and diseases affecting digestive system in large animals. Manifestations, pathology, pathogenesis, diagnosis including special diagnostic procedures, and medical and surgical treatment of gastrointestinal disease including diseases of the liver and pancreas.

**431. Endocrinology and Metabolism** (2.0) II. Black  
Lecture—20 hours. Prerequisite: first year standing in the School of Veterinary Medicine.† Provides a basic understanding of principles of the normal physiological function of the endocrine glands, their hormones, and other factors that affect the regulation of metabolic processes.

**433. Avian Medicine** (1.6) III. West  
Lecture—15 hours; one examination period. Prerequisite: second-year standing in School of Veterinary Medicine. Overview of select infectious diseases of poultry including their diagnosis, management, and control.

**434. Infectious Diseases** (4.5) I. Pedersen  
Lecture—45 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Overview of select infectious diseases of companion and food animals.

**435. Veterinary Hematology** (5.5) I-II. Zink  
Lecture—32 hours; laboratory—23 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine.† Hematopoietic system of animals in health and disease: development of the system, regulatory mechanisms, blood and bone marrow cell morphology and function, methods of evaluation, effects of disease upon the system and diseases of the system. (Deferred grading only, pending completion of two-quarter course.)

**436. Public Health and Food Safety** (2) III. Genigeorgis  
Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor.† Introduction to preventive aspects of vet-

erinary medicine as they relate to zoonoses, environmental hygiene and the safety of foods of animal origin.

**437A. Issues in Veterinary Medicine: Ethics, Animal Use, Professional Standards, and Communications** (0.8) I. Brooks

Discussion—8 hours. Prerequisite: first year standing in the School of Veterinary Medicine.† Introduction to the important responsibilities of veterinarians to society through their role as health care providers.

**438. Introduction to Methods of Animal Handling, Restraint, Examination, and Therapy** (1) III. East Laboratory—8 three-hour sessions. Prerequisite: first-year standing in School of Veterinary Medicine or consent of instructor. Introduction and practice of methods of animal handling and restraint and selected techniques of diagnostic examination and therapy, as well as recognition of animal breeds, breed characteristics and purpose in animal species of veterinary importance. (S/U grading only.)

**439. Beef Cattle Nutrition** (1) III. Hjerpe

Lecture—10 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Economically-sound methods for meeting nutrient requirements of feedlot and pasture beef cattle (including computer-assisted methods). Strategies for presenting nutritional and ration-associated diseases of beef cattle.

**440. Endocrine System (Normal and Abnormal) Structure and Function** (2.8) II. Kennedy

Lecture—24 hours; discussion—3 three-hour sessions; laboratory—1 three-hour session. Prerequisite: second-year standing in School of Veterinary Medicine.† A correlated presentation of the structure and function of the normal and diseased endocrine glands of domesticated animals.

**445A. Reproduction** (6.2) II-III. Stabenfeldt

Lecture—42 hours; laboratory—20 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine.† Structure, function, pathologic and clinical aspects of reproduction (normal and abnormal). (Deferred grading only, pending completion of two-quarter sequence.)

**445B. Small Animal Theriogenology** (1.2) III.

Feldman

Lecture—12 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Conditions affecting the reproductive system in the dog and cat, with emphasis on symptomatology, pathophysiology and treatment. Stressing the development of diagnostic and therapeutic approaches to the clinical patient.

**445C. Food Animal Theriogenology** (3) II. Bon-Durant

Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Conditions affecting the reproductive system in the cow, sow, ewe, and goat, with emphasis on symptomatology, pathophysiology, treatment, control, prevention, and herd health applications.

**445D. Equine Theriogenology** (3) II. Hughes

Lecture—20 hours; laboratory—10 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Discussion of special problems of equine reproduction with emphasis on methods of diagnosis and interpretation of clinical and laboratory findings.

**450. Immunology** (3) I. Gershwin

Lecture—19 hours; laboratory—11 two-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Concepts of immunobiology. Dynamics of infection and resistance. Pathogenetic mechanisms in immunological diseases, allergy, cancer immunology.

**451. Veterinary Bacteriology and Mycology** (5.7) I. Hirsh

Lecture—37 hours; laboratory—20 two and one-half hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine.† An introduction to the nature of bacteria and fungi, their relation to animal disease, and the methods of diagnosing bacteri-

al and mycotic disease.

**452. General Pathology** (4.2) I. Moore

Lecture—24 hours; laboratory—18 two-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Basic pathologic processes, especially their nature and pathogenesis. Includes degenerative changes, circulatory disturbances, inflammation and repair, abnormalities of cell growth and differentiation, and basic immunopathology.

**453. Biology of Infectious Viral Agents** (2.6) II. Yilma

Lecture—16 hours; laboratory—10 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Biology of animal viruses that are agents of infectious diseases. Molecular basis of viral pathogenesis, immunity, and diagnosis.

**454. Clinical Immunology** (2) II. Pedersen

Lecture—14 hours; laboratory—6 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor.† Immune mediated diseases of domestic animals with emphasis on mechanism of disease production, diagnosis, and therapy. Relevant diagnostic tests, their interpretations, and sampling techniques.

**455. Integumentary System** (4.9) I-II. Stannard

Lecture—49 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor.† Course covers structure, function, pathologic and clinical aspects including therapeutics of the integumentary system and diseases of the integumentary system of animals. (Deferred grading only, pending completion of two-quarter course.)

**456. Jurisprudence and Law for the Veterinarian** (2) II. Wilson

Lecture—10 two-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Introduction to principles of veterinary medical jurisprudence and legal concepts pertinent to professional activities. (S/U grading only.)

**457. Veterinary Business Management** (2) II. Wilson

Lecture—10 two-hour sessions. Prerequisite: third- or fourth-year standing in School of Veterinary Medicine or consent of instructor. Course presents a groundwork of information which is essential to the successful management of a veterinary practice. Topics to be covered include basic accounting, medical recordkeeping, money management, business and personal insurance, client relations and tax law. (S/U grading only.)

**459. Veterinary Clinical Cytology** (1.5) II. Zinkl

Lecture—8 hours; laboratory—7 three-hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. Cytology of effusions, aspirates, washings and impression smears of organs and tissues having neoplastic, inflammatory and degenerative lesions.

**460. Emergency and Critical Patient Care** (2) III. Haskins

Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Introduction to the essential and practical concepts of care for emergency and critically ill patients.

**461. Small Animal Orthopedics** (1.7) II. Wind

Lecture—14 hours; laboratory—3 three-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine.† Surgical approaches to joints of the shoulder, hip and stifle, and fractures of the humerus, scapula, radius, ulna, pelvis, femur, tibia, and meta carpals/tarsals.

**462. Radiographic Diagnosis: Small Animal** (2.5) III. Nyland

Lecture—16 hours; discussion—8 two-hour and 1 one-hour sessions. Prerequisite: third-year standing in School of Veterinary Medicine. Diagnostic radiography of small animals for the student electing small animal and mixed tracks. Non-contrast radiology and special procedures will be discussed as they relate to the thorax, abdomen, and musculoskeletal system.

**463. Soft Tissue Surgical Diseases of Small Animals** (1.0) III. Gregory

Lecture—10 hours. Prerequisite: third-year standing in School of Veterinary Medicine.† Pathophysiology and surgical treatment of selected soft tissue diseases in small animals.

**466. Mixed-Large Animal Anesthesiology** (1.5) II. Hildebrand

Lecture—15 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor.† Applied clinical anesthesiology for junior veterinary students. Special techniques and consideration for anesthetizing a variety of species including horses, swine, ruminants, large non-domestic species, cats and dogs.

**467. Small Animal Anesthesiology** (1.5) II. Ilkiw

Lecture—15 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor.† Presentation of material which is basic to safe clinical administration of anesthetic drugs to small animals. Clinical applications, indications and contraindications, and methods of use of common anesthetic drugs and techniques will be discussed.

**468. Equine Lameness and Radiology** (4) III.

Meagher, O'Brien, Pool

Lecture—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine. Principles in the radiologic diagnosis of conditions that cause lameness in the equine will be emphasized. Methods used in large-animal radiography will be illustrated and latest technique for treating equine lameness will be discussed. Anatomy and pathology of some areas of the musculoskeletal system will also be presented.

**468L. Equine Lameness and Radiology** (1) III.

Meagher, O'Brien, Pool

Laboratory—10 three-hour sessions. Prerequisite: course 468 (concurrently). Priority enrollment for students in equine track; others with consent of instructor. Limited enrollment.

**469. Equine Surgery** (2) III. Pascoe

Lecture—20 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor. Designed to allow third-year veterinary students additional training and experience with surgical procedures in the horse.

**469L. Equine Surgery Laboratory** (1) III. Pascoe

Laboratory—10 three-hour sessions. Prerequisite: course 469 (concurrently). Specific surgical procedures of the horse are demonstrated and performed by students. Participants in the course work in groups of three on rotating basis. Limited enrollment.

**470A-470B-470C. Hospital Practices** (2-2-2) I-II-III.

The Staff (Director Veterinary Medicine Teaching Hospital in charge)

Veterinary clinical practices—40 hours. Prerequisite: third-year standing in School of Veterinary Medicine.† Assignments in the medical and surgical services and clinical diagnostic laboratories of the VM Teaching Hospital. (S/U grading only, pending completion of three-quarter sequence.)

**471. General Practice Clinics** (2.5-15) I-II-III; summer (Sessions I and II) and I, Hjerpe

Veterinary clinical practices—40 hours, plus animal-patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with equivalent emphasis on small and large animal species. May be repeated for credit. Students in combined DVM/MPVM program enroll for the summer-fall sequence. (S/U grading only, pending completion of three-term sequence.)

**472. Urban Practice Clinics** (2.5-15) I-II-III. Hjerpe

Veterinary clinical practices—40 hours, plus animal-patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to urban veteri-

nary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Session I-II and I sequence. (S/U grading only, pending completion of three-term sequence.)

**473. Large Animal Practice Clinics (2.5-15) I-II-III.**

Hjerpe

Veterinary clinical practices—40 hours, plus animal-patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to large animal veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II and I sequence. (S/U grading only, pending completion of three-term sequence.)

**474. Equine Practice Clinics (2.5-15) I-II-III.** Hjerpe

Veterinary clinical practices—40 hours, plus animal-patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to equine veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Session I-II and I sequence. (S/U grading only, pending completion of three-term sequence.)

**475. Food Animal Practice Clinics (2.5-15) I-II-III.**

Hjerpe

Veterinary clinical practices—40 hours, plus animal-patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to food animal veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II and I sequence. (S/U grading only, pending completion of three-term sequence.)

**476. Zoological Practice Clinics (2.5-15) I-II-III.**

Hjerpe

Veterinary clinical practices—40 hours, plus animal-patient care and emergency/night coverage (by rotation). Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor. Clinical training in veterinary medicine. Student assignments in medical and surgical services and clinical diagnostic laboratories of VM Teaching Hospital with emphasis on those services relating to zoological veterinary practice. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II and I sequence. (S/U grading only, pending completion of three-term sequence.)

**477. Companion Animal Practice Clinics (2.5-15) I, II, II, summer.** Hjerpe

Veterinary clinical practices—40 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine or consent of instructor (Summer Session students must be enrolled in DVM/MPVM degree program). Clinical training in veterinary medicine. Assignments in the medical and surgical services and clinical diagnostic laboratories of the VM Teaching Hospital with emphasis on small and equine species. May be repeated for credit. Students in combined DVM/MPVM program enroll for the Summer Sessions I-II and I sequence. (S/U grading only, pending completion of three-term sequence.)

**480A-480B. Clinic Rounds for Freshmen (0.4-0.4)**

II-III. The Staff (Director Veterinary Medicine Teaching Hospital in charge)

Discussion—eight 1 1/2 hour sessions per year. Prerequisite: first-year standing in School of Veterinary Medicine.† Discussion of selected cases from VM

Teaching Hospital. (S/U grading only, pending completion of course sequence.)

**481A-481B-481C. Second-year Clinic Rounds (1.2) I-II-III.** The Staff (Director Veterinary Medicine Teaching Hospital in charge)

Discussion—twelve 1 1/2 hour sessions. Prerequisite: second-year standing in School of Veterinary Medicine. Discussion of selected cases from the clinic. (S/U grading only, pending completion of three-quarter sequence.)

## Veterinary Microbiology and Immunology

(School of Veterinary Medicine)

Laurel J. Gershwin, Chairperson of the Department  
Department Office, 2075 Haring Hall (916-752-1400)

**Faculty**

Alexander A. Ardans, D.V.M., M.S., Professor  
(Medicine)

Norman F. Baker, D.V.M., Ph.D., Professor Emeritus  
Ernst L. Biberstein, D.V.M., Ph.D., Professor Emeritus  
Walter M. Boyce, D.V.M., Ph.D., Assistant Professor  
Anthony E. Castro, D.V.M., Ph.D., Associate Adjunct  
Professor (*California Veterinary Diagnostic  
Laboratory*)

Patricia A. Conrad, D.V.M., Ph.D., Assistant Professor  
Laurel J. Gershwin, D.V.M., Ph.D., Associate Professor  
Sharon K. Hietala, Ph.D., Assistant Professor  
(*California Veterinary Diagnostic Laboratory*)  
Dwight C. Hirsh, D.V.M., Ph.D., Professor  
Rance B. LeFebvre, Ph.D., Assistant Professor  
Preston A. Marx, Ph.D., Associate Adjunct Professor  
John W. Osebold, D.V.M., Ph.D., Professor Emeritus  
Jeffrey L. Stott, Ph.D., Associate Professor  
Richard L. Walker, D.V.M., M.P.V.M., Ph.D., Assistant  
Professor (*California Veterinary Diagnostic  
Laboratory*)

Ming Ming Wong, Ph.D., Professor Emeritus  
Tilahun Yilma, D.V.M., Ph.D., Professor  
Yuan Chung Zee, D.V.M., Ph.D., Professor

## Courses in Veterinary Microbiology and Immunology

**Upper Division Courses**

**126. Fundamentals of Immunology (3) I.** Stott

Lecture—3 hours alternate weeks with lecture—2 hours and discussion—1 hour. Prerequisite: Biochemistry 101A or the equivalent. Immune response and defenses of host against infection: antibodies, antigens, antibody-antigen interactions, regulation and manipulation of the immune response, hypersensitivity mechanisms and their relationships to disease processes. Clinical applications of immune phenomena emphasized.

**126L. Immunology Laboratory (2) II.** Stott

Laboratory—6 hours. Prerequisite: course 126. Laboratory procedures in immunology. The immune response to antigens, antigen-antibody interactions, hypersensitivity mechanisms.

**127. Medical Bacteria and Fungi (5) III.** LeFebvre

Lecture—3 hours; laboratory—6 hours. Prerequisite: general microbiology; basic immunology. An introduction to the bacterial and mycotic pathogens of man and animals, with emphasis on pathogenic mechanisms and ecologic aspects of infectious disease. Limited enrollment.

**128. Biology of Animal Viruses (3) I.** Zee

Lecture—3 hours. Prerequisite: Biochemistry 101A or the equivalent. 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.

**\*132. Introduction to Parasitology (5) III.** Conrad  
Lecture—3 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1B. The nomenclature of human and animal parasites, their general morphology, life cycles, epidemiology, diagnostic techniques, and host-parasite relationships. Individual laboratory studies supplemented with demonstrations.

**198. Directed Group Study (1-5) I, II, III.** The Staff  
(Gershwin in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Gershwin in charge)  
(P/NP grading only.)

**Graduate Courses**

**\*228. Molecular Biology of Animal Virus (3) II.** The Staff

Lecture—3 hours. Prerequisite: course 128 or Microbiology 162 or the equivalent. Current status of molecular biology of the major groups of animal viruses. Topics of major emphasis include: virus genome structure, strategy of genome replication and transcription, and regulation of genome expression.

**270. Advanced Immunology (3) II.** Stott

Lecture—3 hours. Prerequisite: course 126 or Veterinary Medicine 450 or consent of instructor. Immunoglobulin structure and function, antigenic determinants, complement, Biology of lymphocytes; cell-mediated immune reactions, immunogenetics, hypersensitivity. Pathogenetic mechanisms in immunological diseases, immunological unresponsiveness, cancer immunology. Dynamics of infection and resistance. Methods in immunochemistry and immunobiology. Offered in odd-numbered years.

**291. Seminar in Immunology (1) I, II, III.** Gershwin  
Seminar—1 hour. A discussion of the current topics in immunology. (S/U grading only.)

**292. Seminar in Animal Virology (1) I, II, III.** Yilma, Zee  
Seminar—1 hour. A discussion of the current topics in animal virology. (S/U grading only.) (Same course as Microbiology 296.)

**293. Seminar in Infectious Diseases (1) I, II, III.**

Hirsh  
Seminar—1 hour. Discussion of current topics and cases of infectious diseases. (S/U grading only.)

**294. Seminar in Parasitology (1) III.** Boyce, Conrad  
Seminar—1 hour. Discussion of current topics in veterinary parasitology and entomology.

**296. Microbiological Diagnosis (2-5) I, II, III.** Gershwin, Hirsh

Discussion—1 hour; laboratory—5-14 hours. Prerequisite: laboratory course in veterinary or medical microbiology or the equivalent; course 293 (concurrently); consent of Chief of Microbiology, VM Teaching Hospital. Lab diagnosis of infectious diseases involving case work at the VM Teaching Hospital. (S/U grading only.)

**298. Group Study (1-5) I, II, III.** The Staff (Gershwin in charge)

**299. Research (1-12) I, II, III.** The Staff  
(S/U grading only.)

## Veterinary Pharmacology and Toxicology

(School of Veterinary Medicine)

Shri N. Giri, B.V.Sc., Ph.D., Chairperson of the Department  
Department Office, 2165 Haring Hall (916-752-1059)

### Faculty

Richard A. Becker, Ph.D., Assistant Adjunct Professor  
Alan R. Buckpitt, Ph.D., Associate Professor  
Gaylord M. Conzelman, Jr., Ph.D., Professor Emeritus  
Francis D. Galey, D.V.M., Ph.D., Assistant Professor  
(*Veterinary Pharmacology and Toxicology, California Veterinary Diagnostic Laboratory*)  
Shri N. Giri, B.V.Sc., Ph.D., Professor  
Robert M. Joy, Ph.D., Professor  
James B. Knaak, Ph.D., Assistant Adjunct Professor  
Michael E. Mount, D.V.M., Ph.D., Associate Professor  
Isaac N. Pessah, Ph.D., Assistant Professor  
Otto G. Raabe, Ph.D., Professor in Residence  
(*Veterinary Pharmacology and Toxicology, Civil Engineering*)  
Henry J. Segall, Ph.D., Professor  
Philip R. Vulliet, D.V.M., Ph.D., Assistant Professor  
Hanspeter Witschi, M.D., Professor (Medicine, Internal Medicine)

### Courses in Veterinary Pharmacology and Toxicology

#### Upper Division Course

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)  
Prerequisite: consent of instructor. (P/NP grading only.)

#### Graduate Courses

**223. Clinical Pharmacokinetics: Concepts and Applications in Comparative Medicine** (2) III. Vulliet Lecture—1 hour; discussion—1 hour. Prerequisite: comparative or veterinary physiology and general pharmacology. Concepts of pharmacokinetics. Absorption and disposition of various drugs, which are used as therapeutic agents, will be compared in different species (man and domestic animals). Course will provide background for research in clinical pharmacology.

**243. Heavy Metal Toxicity and Metabolism** (2) II.

Raabe Lecture—2 hours. Prerequisite: Biochemistry 101A-101B and Physiology 100A-100B. Toxicity and metabolism of inorganic compounds with emphasis on heavy metals. Examines the relationship between chemical properties and biologic activity of various metals. Includes discussions on metal-protein interactions, genetic disorders in metabolism, chelation therapy, and inorganic carcinogenesis. Offered in odd-numbered years.

**247. Natural Toxicants** (2) III. Segall

Lecture—2 hours. Prerequisite: organic chemistry, Biochemistry 101A-101B, or consent of instructor. Toxicity and metabolism of natural toxicants with emphasis on the toxic plants present in the western United States. General pathways of metabolism plus the relationship between chemical properties and biologic activity of natural toxicants are discussed. Offered in even-numbered years.

**\*253. Drug Metabolism** (2) III. Buckpitt

Lecture—2 hours. Prerequisite: Biochemistry 101A-101B or Physiological Sciences 101A-101B; consent of instructor. General pathways of drug metabolism and factors influencing the drug metabolism. Emphasis laid upon the species, age, and genetic differences affecting the biological disposition of the drugs. Offered in even-numbered years.

**258. Receptor-Mediated Mechanisms** (2) III. Pessah

Lecture—2 hours. Prerequisite: Pharmacology and Toxicology 201 or the equivalent. Survey of modern

methods for studying physiological receptors including radioligand binding analysis, ion transport/flux measurements, receptor solubilization and purification strategies, and molecular cloning. Theoretical concepts of receptor-mediated signal transduction, information processing, and mechanisms of drug/toxicant interactions. Offered in odd-numbered years.

**258L. Laboratory in Receptor Methods** (1) III.

Pessah Laboratory—3 hours. Prerequisite: Biochemistry and Biophysics 101L, or course 258 (may be taken concurrently). Design and practical application of receptor binding techniques including subcellular fractionation, equilibrium and kinetic radioligand binding studies, receptor activation/inhibition studies, isotopic ion flux measurements, and analysis of data. Limited to 12 students. Offered in odd-numbered years.

**290. Seminar** (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. (S/U grading only.)

**297T. Tutoring In Veterinary Pharmacology and Toxicology** (1-5) I, II, III. The Staff (Chairperson in Charge)

Students assist in preparation and teaching of courses in Veterinary 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. May be repeated for credit up to 5 units. (S/U grading only.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in Charge)

Prerequisite: consent of instructor. Group study in selected areas of Pharmacology and Toxicology. (S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

#### Professional Course

**405. Veterinary Clinical Pharmacology** (2) II. Vulliet Lecture—2 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of instructor.† Pharmacological basis of therapeutic use of drugs in domestic animals. Emphasis on selection of most appropriate drug, its dosage form, route of administration and dose for treatment of certain disease conditions. (S/U grading only.)

Dewey D. Y. Ryu, Ph.D., Professor (Chemical Engineering)

Vernon L. Singleton, Ph.D., Professor  
M. Andrew Walker, Ph.D., Assistant Professor  
Robert J. Weaver, Ph.D., Professor Emeritus  
A. Dinsmoor Webb, Ph.D., Professor Emeritus  
Larry E. Williams, Ph.D., Associate Professor

**The Program of Study.** Enology is a specialization under the Fermentation Science major; and viticulture is a specialization under the Plant Science and the Agricultural Science and Management (Plant Science option) majors.

**Graduate Study.** Various graduate groups offer programs of study leading to advanced degrees in the fields of viticulture and enology. For the M.S. degree see Agricultural and Environmental Chemistry, Botany, Chemical Engineering, Ecology, Food Science, Genetics, Horticulture, Microbiology, Plant Physiology, and Soil Science. For the Ph.D. degree see Agricultural and Environmental Chemistry, Botany, Chemical Engineering, Ecology, Genetics, Microbiology, Plant Pathology, Plant Physiology, and Soil Science.

## Courses in Viticulture and Enology

### Lower Division Courses

**2. Introduction to Viticulture** (2) III. Mullins

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.

**3. Introduction to Wine Making** (3) I. Noble; II. Kunkee; III. Mullins

Lecture—3 hours. This broad overview of wines introduces students having a general interest (or potential fermentation science (enology) majors) to history of wine, physiology of alcohol, wine appreciation, viticulture, fermentation, and wines produced in California and other areas of the United States and world.

**99. Special Study for Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

(P/NP grading only.)

### Upper Division Courses

**101A. Viticultural Practices** (2) I. Walker

Discussion-laboratory—4 hours. Prerequisite: course 2. Provides the information required to identify the major wine, raisin, and table cultivars grown in California and elsewhere. Also provides experience in vineyard sampling techniques and vine disease identification.

**101B. Viticultural Practices** (2) II. Kliener

Discussion-laboratory—4 hours. Prerequisite: course 2. Field-oriented experience in the principles and practices of grapevine production, including pruning, propagation, weed identification and control, frost protection, and physical examination of soil profiles and root distribution patterns.

**101C. Viticultural Practices** (2) III. Kliener

Discussion-laboratory—4 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.

**\*110. Grapevine Growth and Physiology** (3) III.

Adams, Matthews

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.

**111. World Viticulture** (3) I. Meredith

Lecture—3 hours. Prerequisite: upper division stand-

ing. 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.

**115. Raisin and Table Grape Production (2) I.**

Williams

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. Offered in even-numbered years.

**116. Winegrape Production (3) II.** Kliewer

Lecture—3 hours. Prerequisite: course 2. Covers principles underlying cultural practices associated with winegrape production, including establishing and planting, training, summer and winter pruning, canopy management, irrigation, mineral nutrition, weed control, frost protection, crop regulation, and harvesting.

**\*118. Grapevine Pests, Diseases and Disorders (3) I.** Williams

Lecture—3 hours. Prerequisite: course 2. Describes the 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. Offered in odd-numbered years.

**123. Analysis of Musts and Wines (3) I.** Ough

Lecture—2 hours; laboratory—3 hours. Prerequisite: Chemistry 5, 8A, and 8B. Open to undergraduate students in Fermentation Science and Plant Science, and graduate students in Agricultural and Environmental Chemistry, Food Science, Horticulture, and Microbiology. Principles of grapejuice and wine analysis, and the reasons for use of each analysis. Analyses of a practical and useful nature are chosen for the laboratory exercises demonstrating various chemical, physical, and biochemical methods.

**124. Wine Production (3) I.** Bisson

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 3, Microbiology 2, 3, and Biochemistry 101A; course 123 (may be taken concurrently). Open to undergraduate students in Fermentation Science and Plant Science, and graduate students in Agricultural and Environmental Chemistry, Food Science, Horticulture, and Microbiology. Principles and practice of making the various standard types of wines, with special reference to the grape varieties used and the method of vinification required for each.

**125. Wine Types and Sensory Evaluation (3) II.**

Noble

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 124, Agricultural Science and Management 150, and consent of instructor. Open to upper division students in Fermentation Science and Plant Science, and graduate students in Agricultural and Environmental Chemistry, Food Science, Horticulture, and Microbiology; or consent of instructor. Major types of wines and the factors influencing their quality; principles of sensory evaluation.

**126. Wine Processing (4) II.** Boulton

Lecture—2 hours; laboratory—3 hours; discussion—1 hour. Prerequisite: course 124. Principles of equilibria and rates of various physical and chemical reactions in wines; treatment of unstable components in wines by adsorption, ion exchange, refrigeration, filtration, and membrane processes.

**\*127. Wine Aging: Effects and Reactions (1) III.**

Lecture—seven 1 1/2 hour evening sessions. Prerequisite: course 124. Survey of the methods, chemistry, sensory effects, and management of storage and aging of the major classes of wine.

**135. Wine Processing Equipment (1) II.** Boulton

Lecture—1 hour; field trip. Prerequisite: courses 124, 126; Food Science and Technology 110A, 110B recommended. A course for undergraduates which provides a systematic description of unit operations and processing equipment used in modern commercial winemaking. Emphasis is given to the principles and

techniques of operation and to the performance of this equipment with grapes, juices, and wines.

**\*140. Distilled Beverage Technology (3) III.**

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 even-numbered years.

**145. Critical Evaluation of Wines of the World (1) III.**

Noble and staff

Laboratory-discussion—2 hours. Prerequisite: course 125. To analyze critically non-California wine; several vintages of wines from specific regions will be evaluated in weekly meetings. Assigned students will provide reading for each session. Discussion will focus on relating the wine sensory properties to the assigned reading.

**\*186. Fermentation Science (3) III.** Kunkee, Ogrydziak (Food Science and Technology)

Lecture—3 hours. Prerequisite: Microbiology 2, 3; Biochemistry 101B. Basic principles of fermentation science and biotechnology with emphasis on industrial fermentation processes that generate useful products including fermented food and beverages, pharmaceuticals, fine chemicals, and other gene products. Offered in odd-numbered years.

**192. Internship (1-12) I, II, III, summer.** The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: completion of 84 units. Work-learn 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.)

**198. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

Prerequisite: consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses**

**210. Grape Development and Composition (4) III.**

Morrison

Lecture—3 hours; discussion—1 hour. Prerequisite: Botany 105, 111, 112; Biochemistry 101A, 101B recommended. Anatomy, physiology and biochemistry of grape berry development, with emphasis on the development of grape composition relevant to wine-making.

**216. Vineyard Establishment and Development (3) I.** Kliewer

Lecture-discussion—2 hours; fieldwork—3 hours. Prerequisite: courses 110, 115 or 116, or consent of instructor. Application of basic knowledge in viticulture, meteorology, soil, water, plant, and biological sciences to establishment and development of vineyards. To prepare a comprehensive feasibility study of suitability of a given piece of property for growing wine, raisin, or table grapes. Offered in even-numbered years.

**217. Microbiology of Wine Production (3) III.** Kunkee

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 123, 124, Microbiology 3, Biochemistry 101A, and Chemistry 8B; courses 125, 126 recommended. Nature, development, physiology, biochemistry, and control of yeasts and bacteria involved in the making, aging, and spoilage of wines.

**\*219. Plant Phenolics (3) II.**

Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B or the equivalent and consent of instructor. Flavonoids and other natural phenolic substances of plants; their chemistry, natural occurrence, biochemistry, relation to animal diets, and relation to properties of foods and other products.

**235. Winery Design and Economics (2) II.** Boulton

Lecture—3 hours; 4 design classes; field trip. Prerequisite: course 135, Food Science and Technology

110A-110B, and Computer Science Engineering 10 or Engineering 5. Specialization in the design and economic evaluation of modern commercial wineries. Emphasis is given to the design of new wineries and the interaction of size, grape and bottle prices on the economic feasibility of the venture. (Offered in odd-numbered years.)

**290. Seminar (1) II, III.** Adams

Seminar—1 hour. Prerequisite: consent of instructor. (S/U grading only.)

**290C. Advanced Research Conference (1) I, II, III.**

Research Faculty

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.)

**291. Advances in Viticulture (1) II.** Matthews

Seminar—1 hour. Prerequisite: consent of instructor. Experts in various fields of viticulture will lead discussions on recent advances in their fields of expertise. Emphasis and topics will vary from year to year and course may be repeated for credit. (S/U grading only.)

**292. Advances in Enology (1) III.** Kunkee

Discussion—1 1/2 hours, seven to ten weeks. Prerequisite: courses 123, 124, 125, 126. Discussions of previously assigned reading material, usually in the form of two to three reprints. Discussions led by faculty to acquaint students with their current research interests. May be repeated for credit. (S/U grading only.)

**297T. Tutoring In Viticulture and Enology (1-5) I, II, III.** The Staff (Chairperson in charge)

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) I, II, III.** The Staff (Chairperson in charge)

(S/U grading only.)

**299. Research (1-12) I, II, III.** The Staff (Chairperson in charge)

(S/U grading only.)

## War-Peace Studies

(College of Letters and Science)

The interdisciplinary minor in War-Peace Studies examines factors affecting the onset of world war and efforts to establish world peace.

Students in the minor are encouraged to participate in the programs of the Davis Chapter of the UC Institute on Global Conflict and Cooperation (IGCC). For more information on Davis IGCC, call 916-752-6562.

The minor is sponsored by the Department of Sociology, 139 Young Hall. The faculty advisor is Prof. John Lofland, Department of Sociology 102B Young Hall, 916-752-1580.

### Minor Program Requirements:

UNITS

War-Peace Studies ..... 23-24  
Cultural

One course from the following:

American Studies 101F

Comparative Literature 157

Geography 124

Russian 130

#### Economic and Historical

One course from the following:

Economics 117,120

History 137C, 174C

**Political**

Two courses from the following:

Political Science 121, 126, 130, 131, 132, 136

**Sociological**

One course from the following:

Sociology 118, 119, 157

**Technological**

One course from the following:

Physics/Applied Science

Engineering 137

Environmental Studies 165

Introductory. Recommended GE preparation: Chemistry 10 and Physics 10.

**103. Water Quality, Salt Control and Reclamation**

(4) I. Biggar

Lecture—3 hours; laboratory—3 hours. Prerequisite: course in soil or water chemistry or consent of instructor. Water quality parameters, water analysis and salinity control in relation to soil and plant factors; reclamation of soil and disposal of waste water and their effects on receiving waters; localized and regional river basin problems in relation to salinity control and water quality.

**104. Plant-Water-Soil Relationships** (4) III. Hsiao

Lecture—3 hours; discussion—1 hour; two mid-quarter examinations to be arranged. Prerequisite: course 100 or the equivalent preparation in elements of water in soil and plants, Soil Science 100 and one additional course in soils or plant physiology; or consent of instructor. Principles of plant interactions with soil and water environments and their applications in crop and environmental management. Including nutrient and water uptake and transport; transpiration; soil processes affecting supplies; deficiencies and plant responses.

**110. Irrigation Principles and Practices** (3) II. The Staff

Lecture—2 hours; laboratory—3 hours. Prerequisite: Physics 5A; Soil Science 100 recommended. General course for agricultural and engineering students dealing with soil and plant aspects of irrigation and drainage. Soil-water movement and storage, plant responses to irrigation regimes, water use by crops; procedures for determining frequency and depth of irrigation, drainage.

**122. Biology of Running Waters** (3) I. Knight

Lecture—2 hours; discussion—1 hour. Prerequisite: introductory course in biology and junior standing. The study of lotic aquatic animals and plants in relation to their environment; various factors affecting the distribution of freshwater plants and animals is emphasized in a manner particularly suitable for students of freshwater ecology, soil and water science, and renewable natural resources.

**122L. Biology of Running Waters Laboratory** (2) I. Knight

Laboratory—2 hours (including 2 or 3 weekend field trips). Prerequisite: introductory course in biology or consent of instructor and junior standing; course 122 (concurrently). Course allows interested students to obtain experience in sampling, processing, and synthesizing field data. Field trips will allow students to obtain an understanding of the structure and function of stream ecosystems.

**140. Seepage and Drainage** (3) III. Grismer

Lecture—3 hours. Prerequisite: Engineering 103A or course 142. Flow through porous media; measurement of hydraulic conductivity; seepage under hydraulic structures; anisotropy flow nets, drainage design for water table and salt control. (Same course as Agricultural Engineering 140.)

**141. Hydrology** (3) II. Puente

Lecture—3 hours. Prerequisite: consent of instructor. Principles of hydrologic analysis including consideration of precipitation, stream flow, and ground water phenomena.

**142. Hydraulics** (3) I. Scott, Burgoyne

Lecture—2 hours; laboratory-discussion—3 hours. Prerequisite: Physics 1A; course 100 recommended. An introductory course for non-engineers. Physical properties of water; fluid statics; principles and equations of flow, continuity, and conservation; flow in pipes and open channels, flow measurements; and pump performance and selection.

**145. Irrigation and Drainage Systems** (4) II. Wallender, Grismer, Hills

Lecture—4 hours. Prerequisite: Engineering 103A or course 142. Engineering and scientific principles applied to the design of surface, sprinkler and micro irrigation systems and drainage systems within economic and environmental constraints. Interaction between irrigation and drainage will be emphasized. (Same course as Agricultural Engineering 145.)

**149A. Groundwater Hydrology** (3) I. Marino

Lecture—3 hours. Prerequisite: Mathematics 16B and course 100; course 142 or Engineering 103A recommended. Occurrence, distribution, and movement of groundwater. Steady and transient groundwater-flow systems. Aquifer tests. Well construction, operation, and maintenance. Groundwater exploration, quality, and contamination.

**149B. Groundwater Hydrology** (3) II. Fogg

Lecture—3 hours: prerequisite: course 149A or Civil Engineering 144. Groundwater geology and chemistry. Physical and chemical processes in contaminant transport, with emphasis on effects of aquifer complexity. Fundamentals of groundwater flow and transport modeling. Geophysical methods in groundwater.

**149L. Groundwater Hydrology Laboratory** (1) II. Fogg

Laboratory—3 hours. Prerequisite: course 149A or Civil Engineering 144; course 149B (may be taken concurrently). Groundwater flow and transport. Processes are illustrated in experiments carried out with lab apparatus, computers, or analytical models. Well-test analysis in non-ideal aquifers, computer modeling of flow and transport, and field-testing of wells.

**150. Water Law and Water Institutions** (3) II. The Staff

Lecture—3 hours. Introductory course in water law and institutions. Current problems. Basic principles, with utilization of case-study method. Water rights: kind, acquisition, adjudication, administration and loss. Water organizations and enterprises; kinds, organization, financing, public regulation. Acreage limitation. Water pollution.

**\*154. Water and Related Resource Allocation from Economic Principles** (2) I. Grimes

Lecture—2 hours. Prerequisite: Mathematics 16A or consent of instructor. An examination of information needed for analysis and basic procedures of production economics used for an appropriate allocation of water and related resources in agriculture. Cost minimization in production and alternative goals are considered. Offered in even-numbered years.

**160. Surface Water Application Systems** (3) II. Wallender

Lecture—3 hours. Prerequisite: courses 110, 142, and Mathematics 16B. Application of physical and engineering principles to design, construction, operation and maintenance of surface irrigation systems, including planning for on-the-farm land leveling and water delivery.

**172. Farm Irrigation Management** (3) III. Hopmans

Lecture—3 hours; one field trip. Prerequisite: course 104 or 110, or consent of instructor.

The water budget is used as a means of orderly analysis of plant, soil, climatic, systems, and operational factors to develop a rationale for farm irrigation practices. Plant and soil factors are emphasized.

**180. Chemistry of the Hydrosphere** (3) III. Tanji

Lecture—3 hours. Prerequisite: Chemistry 5 and introductory courses in geology, soils, hydrology or limnology. To provide an understanding of various mechanisms and processes regulating the chemistry of natural waters. Linkage between hydrologic and geochemical cycles is stressed. Covered are chemical characteristics of rainwater and snow, streams and rivers, lakes, ground waters, estuaries, and oceans.

**192. Water Science Internship** (1-12) I, II, III, The Staff

(Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learn experience off and on campus in water science. Internship supervised by a member of the faculty. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III, The Staff

(Chairperson in charge)

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: senior standing. (P/NP grading only.)

**Graduate Courses****200. Modeling of Soil-Water-Plant Continuum (3)**

III. Hopmans

Lecture/laboratory—2 hours; discussion—1 hour. Prerequisite: course 104; Soil Science 107; introductory knowledge of FORTRAN programming. Use of computer programming to simulate transport processes in soils and plants. Alternative irrigation water management scenarios to minimize water losses, deep percolation and salt emissions while maintaining crop production. Modeling of root water uptake and evapotranspiration in irrigation scheduling. Offered in odd-numbered years.

**201. Advanced Plant-Water Relations (3)** I. Hsiao

Lecture—3 hours; discussion sessions. Prerequisite: course 104 or Plant Science 101 or Botany 111; elementary knowledge of metabolism and rudiments of thermodynamics or concurrent enrollment in 1 unit of course 298 with instructor. Chemical and component potentials of water; quantitative aspects of water transport to, within, and from plants; dynamics, regulation, and environmental factors affecting plant water status; metabolic and other characteristics associated with efficient water use, and with xerophytes; responses to water deficiency and salinity. Offered every fourth quarter.

**202. Evapotranspiration (2)** III. The Staff

Lecture—2 hours. Prerequisite: Atmospheric Science 105, or consent of instructor. Radiation and energy balances of water, soil, and vegetative surfaces and the effects of wind, temperature, humidity thereon. Lysimeter and other measurement techniques. Prediction of evapotranspiration from aerodynamic, energy balance, and empirical approaches.

**206. Water Resource Systems Analysis (3)** I. Mariño

Lecture—3 hours. Prerequisite: course 141 and Statistics 131A, or consent of instructor. Applications of deterministic and stochastic mathematical programming techniques to water resource planning, analysis, and design. Water allocation, capacity expansion, and reservoir operation. Conjunctive use of surface water and groundwater. Water quality management. Irrigation planning and operation models.

**\*215. Advanced Topics in Water and Soil Chemistry (3)** III. Biggar

Lecture—3 hours. Prerequisite: course in physical chemistry and soil chemistry or consent of instructor. Advanced course in water chemistry emphasizing principles governing interactions of ionic constituents in water with sediment and soils. Topics include electro-kinetic properties of clays, membrane phenomena, rate processes and thermodynamic applications to the water soil system. Offered in odd-numbered years.

**217. Hydrochemical Models (3)** II. Tanji

Lecture—2 hours; laboratory—3 hours. Prerequisite: physical chemistry, calculus and computer programming or consent of instructor. Mathematical and computer modeling of chemical state variables and terrestrial and aquatic systems. Equilibrium and rate models; transport models; systems assessment and simulations.

**222. The Biology of Streams (5)** III. Knight

Discussion—2 hours; seminar—1 hour; laboratory—6 hours (includes field trips). Prerequisite: courses in aquatic entomology, limnology, and phycology. Course will relate various environmental factors to the ecology and productivity of flowing freshwater systems. Emphasis is placed on relationships between stream organisms and their environment by means of integrated field and lecture activities. Offered in even-numbered years.

**240. Infiltration and Drainage (3)** II. Grismer

Lecture—3 hours. Prerequisite: Soil Science 107; course 140/Agricultural Engineering 140. Aspects of multi-phase flow in soils and their application to infiltration and drainage. Gas phase transport and entrapment during infiltration, and transient drainage with nonlinearity, capillarity, and evapotranspiration. Offered in odd-numbered years. (Same course as Agricultural Engineering 240.)

**250. Advanced Soil Physics (3)** III. Nielsen

Lecture—3 hours. Prerequisite: Mathematics 22B or

consent of instructor; Soil Science 107 and 207 recommended. Theoretical and applied aspects of the simultaneous transport and retention of water, solutes, heat, and gases in unsaturated soils. Miscible and immiscible displacement theories. Emphasis given to current soil physics research topics of general interest in soil, water, and engineering sciences. Offered in even-numbered years.

**255. Analysis of Random Fields (3)** III. Puente

Lecture—3 hours. Prerequisite: upper division course in probability and statistics. Covers techniques used to describe random phenomena in two or three dimensions. Of particular interest are covariance and spectrum methods, local averaging, extremes, and interpolation. Course to show applications in water and soil sciences. Offered in odd-numbered years.

**290. Seminar (1)** II. Knight

Seminar—1 hour. Prerequisite: graduate standing. Critical review of relevant water quality problems and recent water quality research and literature.

**291. Seminar in Water-Soil-Plant Relations and Irrigation (1)** I, II, III. The Staff

Seminar—1 hour. Prerequisite: graduate standing and background in water-soil-plant relations. Informal presentation on current developments in water-soil-plant relations, plant water use, and irrigation management. Associated discussion analyzes research approaches and techniques and data interpretations. (S/U grading only.)

**298. Group Study (1-5)** I, II, III. The Staff (Chairperson in charge)

(Chairperson in charge)

(S/U grading only.)

## Wildlife and Fisheries Biology

(College of Agricultural and Environmental Sciences)

Daniel W. Anderson, Ph.D., Chairperson of the Department

Department Office, 66 Briggs Hall (916-752-6586)

**Faculty**

Daniel W. Anderson, Ph.D., Professor

Louis W. Botsford, Ph.D., Professor

Joseph J. Cech, Jr., Ph.D., Professor

Ronald E. Cole, B.S., Lecturer

Chris Dewees, Ph.D., Lecturer

Walter E. Howard, Ph.D., Professor Emeritus

Nadine K. Jacobsen, Ph.D., Associate Professor

Dale F. Lott, Ph.D., Professor

Rex E. Marsh, A.B., Lecturer

Peter B. Moyle, Ph.D., Professor

Dennis G. Raveling, Ph.D., Professor

Robert G. Schwab, Ph.D., Associate Professor

Dirk van Vuren, Ph.D., Assistant Professor

**The Major Program**

The Wildlife and Fisheries Biology major deals with the relationships among the needs of man and the requirements of wildlife (including fishes). Understanding these relationships is vital for the maintenance of ecological diversity, recreational resources, and food supplies for future generations. Certain species of wildlife are threatened because they cannot adapt to man's activities, whereas others have thrived so well under man-made changes in the environment that their numbers must be controlled. A third wildlife problem is the optimal management of recreational or commercial harvests.

Because of the diversity of problems in the field, emphasis in the major is placed on broad training in biological and physical sciences, with specialization in wildlife or fisheries. The major is designed primarily for students interested in eventually becoming professionals in wildlife and fisheries biology, but its breadth of course requirements, when combined with suitable electives, also make it suitable as a preparatory major for such areas as veterinary medicine and secondary school teaching. Certification by professional societies such as the Wildlife Society, American Fisheries Society, or the Ecological Society of America or preparation for specialized resource-related graduate studies may also be achieved by careful planning of electives with a faculty adviser.

Graduate training in the Division of Wildlife and Fisheries Biology leads to M.S. or Ph.D. degrees in such disciplinary fields as Ecology, Physiology, Applied Mathematics, International Agricultural Development, and Animal Behavior under the supervision of a Wildlife and Fisheries Biology faculty member.

Positions now held by graduates in this major include wildlife, fisheries, animal control, and resource biologists and managers with local, state and federal agencies. Some graduates are biologists or consultants with private industries such as commercial fishing businesses, electrical utilities, sportsmen's clubs, aquaculture operations, and environmental consulting firms. Also, some are veterinarians, medical physicians, and professors/researchers who teach and/or conduct research in academic institutions. Most of these positions have been attained after further study and relevant experience.

**B.S. Major Requirements:**

	UNITS
Written/Oral Expression	8
English (English 1)	4
Rhetoric (Rhetoric and Communication 1)	4

Note: above courses simultaneously satisfy College requirement.

**Preparatory Subject Matter .....56-59**

Biological sciences (Biological Sciences 1A, 1B, 1C).....	15
Chemistry (Chemistry 1A, 1B, 8A, 8B).....	16
Computer science (Computer Science Engineering 10 or Engineering 5).....	3
Mathematics (Mathematics 16A, 16B; 16C recommended).....	6-9
Physics (Physics 5A, 5B, 5C).....	12
Statistics (Statistics 13 or Agricultural Science and Management 150).....	4

**Breadth/General Education .....6-24**

Satisfaction of General Education requirement (with adviser's approval).....	6-24
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**Depth Subject Matter .....38-41**

Chemistry (Biochemistry and Biophysics 101A-101B or Physiological Sciences 101A-101B).....	6-7
Ecology (Environmental Studies 100 or Zoology 125).....	3-4
Evolution (Genetics 103 or Zoology 148).....	3-4
Genetics (Genetics 100).....	4
Physiology (Physiology 110).....	5
Vertebrate anatomy (Zoology 105).....	5
Wildlife and fisheries (Wildlife and Fisheries Biology 122, 130, 140).....	12

**Restricted Electives (Select Plan I or Plan II)****Plan I: Wildlife Biology specialization .....25-26**

Botany (Botany 102 or 108, Botany 117).....	9
Statistics (Statistics 104, 106, 108, or 110).....	3-4
Wildlife biology (Wildlife and Fisheries Biology 100, 110, 111, 111L).....	13

**Plan II: Fisheries Biology specialization .....26-32**

Aquatic entomology/invertebrate zoology (Entomology 116 or Zoology 112 with adviser's approval).....	3-5
Fisheries biology (Wildlife and Fisheries Biology 102, 120, 120L, 121).....	14
Limnology/oceanography/stream biology (Environmental Studies 116 or 150C or 151 or Water Science 122).....	3-4
Statistics (Statistics 104, 106, 108 or 110).....	6-9

**Unrestricted Electives .....16-47****Total Units for the Degree .....180**

**Major Adviser.** Contact Department office (66 Briggs).

**Graduate Study.** See the Graduate Division section in this catalog.

**Related Courses.** A selection of courses may depend on each student's special interests. A set of related courses is available from advisers.

## Courses in Wildlife and Fisheries Biology

### Lower Division Courses

#### 10. Concepts of Wildlife Ecology (4) I. The Staff

Lecture—3 hours; discussion—1 hour. Prerequisite: Biological Sciences 1A recommended. Concepts of ecology needed to understand wildlife issues such as endangered species, fisheries management, hunting and pest management. Includes political, economic, social, and legal aspects. General Education credit: Nature and Environment/Introductory.

#### 92. Internship (1-6) I, II, III. The Staff (Department Chairperson in charge)

Laboratory—3-18 hours. Prerequisite: lower division standing and consent of instructor. Work-learn 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.)

### Upper Division Courses

#### 100. Field Methods in Wildlife Biology (3) III. The Staff

Lecture—10 hours total; laboratory—40 hours total (5 days). Prerequisite: course 110 or 111-111L; Zoology 125 or the equivalent; consent of instructor. Intensive course on methods of studying and reporting

data obtained from free-ranging wildlife. Held between winter and spring quarters; considered a spring course for preenrollment. Limited enrollment. (P/NP grading only.)

#### 102. Field Studies in Fisheries Biology (6) Extra-session summer. Moyle, Cech

Discussion—1 hour; laboratory—40-60 hours. Prerequisite: upper division course each in ecology and fish biology; consent of instructor. Special session course emphasizes field investigations in fisheries biology including 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 in even-numbered years.

#### 110. Mammalian Biology and Ecology (5) III. Schwab

Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B, 1C, or the equivalent; course in ecology recommended. Integrated introduction to the biology and ecology of nondomestic mammals. Emphasis on natural history, taxonomy, geographical-ecological distribution, anatomical-physiological-behavioral adaptations of mammals to their environment, and research-management methodologies.

#### 111. Biology and Management of Wild Birds (3) I. Anderson, Raveling

Lecture—3 hours. Prerequisite: upper division course in ecology or consent of instructor. Phylogeny, distribution, migration, reproduction, population dynamics, behavior, and physiological ecology of wild birds. Emphasis on adaptations to environments, species interactions, and management considerations. Students who have had Zoology 137 may not receive credit for this course.

#### 111L. Laboratory in Biology and Management of Wild Birds (2) I. Anderson, Raveling

Laboratory—6 hours. Prerequisite: course 111 (may be taken concurrently); consent of instructor. Laboratory exercises in bird species identification, anatomy, molts, age and sex, specialized adaptations, behavior, and research and management techniques.

#### 120. Biology of Fish (3) I. Moyle

Lecture—3 hours. Prerequisite: Biological Sciences 1B. Introduction to ecology, morphology, evolution, and systematics of fishes and their relationship to fisheries management.

#### 120L. Biology of Fish Laboratory (1) I. Moyle

Laboratory—3 hours. Prerequisite: course 120 (may be taken concurrently). Laboratory exercises in the morphology, systematics, and identification of fishes, emphasizing the freshwater and marine fishes of California.

#### 121. Physiology of Fishes (4) II. Cech

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.

#### 122. Population Dynamics and Estimation (4) III. Botsford

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.

#### 130. Physiological Ecology of Wildlife (4) II. Jacobsen

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110, 111, or 120; Physiology 110 and Zoology 125 or the equivalent. A study of animal functions, adaptations, and ecological energetics of wildlife. Nutrition, metabolism, thermoregulation, and productivity are emphasized as a pattern of relationships for understanding the distribution and abundance of wildlife in time and space.

#### 131. Biology and Management of Cervidae (3) II. Jacobsen

Lecture—2 hours; laboratory—3 hours. Prerequisite: Physiology 110 and Zoology 125, or the equivalent; course 110 recommended. Evolution, biology, and management of cervids. Topics include differences in nutritive ecology, bioenergetics, reproduction and growth, use of habitats, and research methodologies. Emphasis on North American species of caribou, elk, moose, and deer. Offered in odd-numbered years.

#### 136. Ecology of Waterfowl and Game Birds (3) II. Raveling

Lecture—2 hours; laboratory—3 hours; field trip. Prerequisite: courses 111 and 111L or the equivalent. Detailed examination of distribution, behavior, population dynamics, and management of waterfowl and upland game birds. Offered in even-numbered years.

#### 140. Ecology and Evolution of Vertebrate Social Organization (4) II. Lott

Lecture—4 hours. Prerequisite: Biological Sciences 1B or upper division ecology course (Zoology 125 or the equivalent). Spacing competition, cooperation, and grouping of wild vertebrates are described and analyzed as adaptive products of their evolutionary history and ecology. Minimal consideration is given to humans and other primates.

#### 151. Wildlife Ecology (3) I. van Vuren

Lecture—3 hours. Consideration of the ecology of wildlife species in man-disturbed environments, including ecological aspects of wild vertebrates in relation to reforestation, range management, and pollution; the relationship of wildlife to recreation and wildlands; and resource conservation in the human ecosystem.

#### 153. Wildlife Ecotoxicology (4) II. Anderson

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 in odd-numbered years.

#### 190. Proseminar in Wildlife and Fisheries Biology (1) I, II, III. The Staff

Seminar—1 hour. Prerequisite: upper division standing in biological sciences or consent of instructor. Reports and discussions of recent advances related to wildlife and fisheries biology. May be repeated twice for credit. (P/NP grading only.)

#### 190C. Research Group Conference (1) I, II, III. The Staff (Chairperson in charge)

Discussion—1 hour. Prerequisite: advanced standing; consent of instructor. Weekly conference on research problems, progress and techniques in wildlife and fisheries biology. May be repeated for credit. (P/NP grading only.)

#### 191. Museum Science (2) II. Cole

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. Offered in even-numbered years. (P/NP grading only.)

#### 192. Internship (1-12) I, II, III, summer. The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learn 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.)

#### 197T. Tutoring In Wildlife and Fisheries (1-5) I, II, III. The Staff (Chairperson in charge)

Prerequisite: major in Wildlife and Fisheries Biology and consent of instructor. Experience in teaching under guidance of faculty member. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)

#### Graduate Courses

**201. Field Research in Wildlife Biology** (6) Extra-session summer. The Staff Lecture—1 hour; laboratory—40 hours; individual research projects and oral and written reports. Prerequisite: courses 140, 110, or 111-111L, Zoology 125, Statistics 102, or the equivalent; consent of instructor. Field research in wildlife biology; formulation of testable hypotheses, experimental design, execution of the study, data reduction, and preparation of suitable written and oral reports. Limited enrollment. Preference given to graduate students in wildlife areas of study. (S/U grading only.)

**222. Advanced Population Dynamics** (3) II. Botsford Lecture—3 hours. Prerequisite: graduate standing; advanced course in ecology (e.g., Zoology 125), 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.

**252. Principles of Vertebrate Control** (3) I. The Staff Lecture—3 hours. Prerequisite: graduate standing or consent of instructor. Principles and concepts concerning the ecological, behavioral, economic, philosophical, and historical basis of managing wild vertebrates that have become pests.

**290. Seminar** (1-3) I, II, III. The Staff (Chairperson in charge) 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)

**290C. Research Group Conference** (1) I, II, III. The Staff (Chairperson in charge) 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.)

**292. Physiology of Fishes Seminar** (1) I. Cech 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 three times for credit. (S/U grading only.)

**293. Seminar in Wildlife Disease Ecology** (2) III. Theis (Medical Microbiology) in charge, Raveling Seminar—2 hours. Prerequisite: graduate status or advanced undergraduate in biology; consent of instructor. Presentation and analysis of assigned research papers in wildlife disease ecology related to considerations of habitat quality, population regulation, wildlife management, and/or implications for human or domestic animal health. (S/U grading only.)

**297T. Supervised Teaching in Wildlife and Fisheries Biology** (1-3) I, II, III. The Staff 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 and Fisheries 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.)

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

Lectures and/or discussions—1-5 hours.

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

## Women's Studies Program

(College of Letters and Science)

Judith Newton, Ph.D. Program Director  
Program Office, 307 Young Hall (916-752-4686)

### Committee in Charge

Carol Joffee, Ph.D. (*Sociology, Women's Studies*)  
Suad Joseph, Ph.D. (*Anthropology*)  
3<sup>4</sup> Anna K. Kuhn, Ph.D. (*German*)  
Lata Mani, Ph.D. (*History*)  
3<sup>4</sup> Patricia Moran, Ph.D. (*English*)  
Linda A. Morris, Ph.D., ex officio (*English*)  
Belinda Robnett, Ph.D. (*Sociology*)  
Vicki Ruiz, Ph.D. (*History*)  
Judith Stacey, Ph.D. (*Sociology, Women's Studies*)  
Bev Tuel (*Staff Assistant*)  
Trang T.T. Duong (*Academic Peer Adviser*)

### Faculty

Cynthia L. Brantley, Ph.D., Associate Professor (*History*)  
Angie Chabram, Ph.D., Associate Professor (*Chicano Studies*)  
Doris Earnshaw, Ph.D., Lecturer (*Comparative Literature*)  
Karen P. Erickson, Ph.D., Professor (*Psychology*)  
Diane Felmlee, Ph.D., Associate Professor (*Sociology*)  
Yvette Flores-Ortiz, Ph.D., Assistant Professor (*Chicano Studies*)  
Jack D. Forbes, Ph.D., Director (*Native American Studies*)  
Zunilda Gertel, Ph.D., Professor (*Spanish and Classics*)  
Sandra Gilbert, Ph.D., Professor (*English*)  
Caroline Henton, Ph.D., Assistant Professor (*Linguistics*)  
Inez Hernandez, Ph.D., Assistant Professor (*Native American Studies*)  
Sarah B. Hrdy, Ph.D., Professor (*Anthropology*)  
Mary Jackman, Ph.D., Professor (*Political Science*)  
Carol Joffee, Ph.D., Professor (*Sociology, Women's Studies*)  
Suad Joseph, Ph.D., Associate Professor (*Anthropology*)  
Cathy Kudlick, Ph.D., Assistant Professor (*History*)  
Anna K. Kuhn, Ph.D., Associate Professor (*German*)  
Dianne Sachko Macleod, Ph.D., Assistant Professor (*Art History*)  
Lata Mani, Ph.D., Assistant Professor (*Women's Studies*)  
Susan Mann, Ph.D., Professor (*History*)  
Sandra J. McPherson, Ph.D., Professor (*English*)  
Jacquelyn Mitchell, Ph.D., Associate Professor (*Afro-American Studies*)  
Patricia Moran, Ph.D., Assistant Professor (*English*)  
Judith Newton, Ph.D., Associate Professor (*Women's Studies*)  
Beatriz M. Pesquera, Ph.D., Assistant Professor (*Sociology, Chicano Studies*)  
Michelle Praeger, Ph.D., Assistant Professor (*French and Italian*)  
Donna Reed, Ph.D., Lecturer (*Comparative Literature*)  
Ada Riddell, Ph.D., Professor (*Chicano Studies*)  
Belinda Robnett, Assistant Professor (*Sociology*)  
Irit Rogoff, Ph.D., Professor (*Art History*)  
Lynn Roller, Ph.D., Associate Professor (*Classics*)  
Ruth E. Rosen, Ph.D., Associate Professor (*History*)  
Vicki L. Ruiz, Ph.D., Associate Professor (*History*)  
Stephanie A. Shields, Ph.D., Associate Professor (*Psychology*)  
Barbara Sommer, Ph.D., Lecturer (*Psychology*)  
Judith Stacey, Ph.D., Professor (*Sociology, Women's Studies*)  
Margit Stange, Ph.D., Assistant Professor (*English*)

Lenora A. Timm, Ph.D., Professor (*Linguistics*)

Marian B. Ury, Ph.D., Professor (*Comparative Literature*)  
Diane Wolfe, Ph.D., Assistant Professor (*Sociology*)

## The Major Program

The interdepartmental major in Women's Studies explores the ways in which, especially for women, but also for men, gender has affected cultural achievements, historical events, and socio-economic structures. Scholars from many disciplines are pooling their knowledge about female experience in all its racial, class, and ethnic diversity. Examining women's artistic and intellectual achievements, women's political and sociocultural history, and women's ways of living in cultures and societies all over the world—subjects that students and teachers at universities have almost never seriously researched before—these scholars have begun to define the ways in which the pressures of femaleness (and maleness) have affected not only women's (and men's) cultural achievements, but also the historic events and socioeconomic structures in which both sexes participate.

Students majoring in this field may take courses in Afro-American studies, American studies, anthropology, comparative literature, English, history, linguistics, Chicano studies, political science, psychology, Russian, sociology, Asian American studies, human development, Native American studies, and other related disciplines. Depending on individual career goals, each student will design a program in consultation with an adviser.

**Career Alternatives.** Preprofessional students who major in Women's Studies will discover that it offers useful undergraduate training for schools of medicine and law, particularly, in medicine, for specialties in obstetrics/gynecology, family practice, pediatrics, or psychiatry; and in law, for special ties in social or family related issues. In addition, students who plan to do practical work in counseling, clinical psychology, social services, or political science will find Women's Studies a helpful undergraduate major, while more theoretically inclined students who wish to go on to graduate research in such fields as literature, philosophy, sociology, anthropology, psychology, economics, or political science will benefit from a strong undergraduate background in women's studies. Increasingly, too, specialists in this field are being used as consultants in industry, higher education, insurance companies and personnel firms. Lately, moreover, state and federal government agencies require people who have special training in understanding the problems that women face in society. Finally, educational institutions need specialists to develop and administer women's studies programs, women's centers, and other institutional structures designed specifically to study and assist women.

## A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>20-33</b>
History 72A .....	4
Women's Studies 50 .....	4
All Preparatory Subject Matter listed for a single discipline in an area of student's interest, chosen in consultation with adviser .....	12-25
<b>Depth Subject Matter</b> .....	<b>44</b>
Women's Studies 190A-190B .....	8
At least 36 upper division units to be chosen with consent of adviser including at least 8 units from Area A, at least 12 units from Area B, and up to 16 units of special topic courses .....	36
<i>Area A: Women and the Humanities</i> ..(minimum) 8 Comparative Literature 135, 159C, English 155B, 185, Linguistics 113.	
<i>Area B: Gender and Society</i> ..(minimum) 12 Afro-American Studies 123, 133, American Studies 101B, Anthropology 130, 131, 134, Asian American Studies 112,	

Chicano Studies 102, Human Development 110, Native American Studies 180, Political Science 166, Psychology 114, 149, Sociology 131, 132, 133.  
Special topic courses .....(maximum) 16  
(List of acceptable courses offered throughout the University, will be available from major advisers.)

**Total Units for the Major** .....64-77

#### Recommended

The following courses are recommended: American Studies 1F, 30, Biological Sciences 10, Economics 151B, Genetics 10, History 72B, Physiology 10, Statistics 13.

#### Minor Program Requirements:

UNITS

**Women's Studies** .....24

Women's Studies 50 .....4  
Upper division units in women's studies area with courses to be chosen in consultation with adviser .....20  
At least 4 units must be from Area A (above) and 8 units from Area B (above). Remaining courses may be elected from Area A and/or B, and/or from relevant special topic courses in the field (current list is available from Women's Studies advisers).

**Major Adviser.** See *Class Schedule and Room Directory*.

#### Courses in Women's Studies

##### Lower Division Course

**50. Introduction to Women's Studies** (4) I, II, III.

The Staff

Lecture—3 hours; discussion—1 hour or term paper (instructor's option). Interdisciplinary introduction which will survey and integrate literary, anthropological, psychological, historical, sociological and biological perspectives on the study of sex roles. General Education credit: Contemporary Societies/Non-Introductory. Recommended GE preparation: any introductory GE course in the areas of Civilization and Culture or Contemporary Societies.

##### Upper Division Courses

**190A. Senior Research Seminar I** (4) I. The Staff

Seminar—4 hours. Prerequisite: twenty units in Women's Studies and consent of instructor. Guided reading, discussion, and writing, culminating in the preparation of a research proposal.

**190B. Senior Research Seminar II** (4) II. The Staff

Seminar—4 hours. Prerequisite: course 190A. Completion of individual research project formulated in course 190A; seminar discussion of topics and problems related to individual projects

**192. Internship in Women's Studies** (1-12) I, II, III.

The Staff

Work-learn experience—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.)

**197T. Tutoring in Women's Studies** (1-4) I, II, III.

The Staff (Director in charge)

Tutoring—3-12 hours. Prerequisite: upper division standing; completion of course to be tutored with grade of A- or better. 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, leading discussion groups. (P/NP grading only.)

**198. Directed Group Study** (1-5) I, II, III. The Staff (Director in charge)  
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

**199. Special Study for Advanced Undergraduates** (1-5) I, II, III. The Staff (Director in charge)  
Prerequisite: upper division standing; consent of instructor. (P/NP grading only.)

## Zoology

(College of Letters and Science)

John H. Crowe, Ph.D., Chairperson of the Department  
Arthur M. Shapiro, Ph.D., Vice-Chairperson of the Department  
Department Office, 2320 Storer Hall (916-752-1272)

#### Faculty

Peter B. Armstrong, Ph.D., Professor  
1 Ronald J. Baskin, Ph.D., Professor  
James S. Clegg, Ph.D., Professor  
John H. Crowe, Ph.D., Professor  
David W. Deamer, Ph.D., Professor  
Olaf Ellers, Ph.D., Assistant Professor  
Carol A. Erickson, Ph.D., Professor  
Robert D. Grey, Ph.D., Professor  
Richard K. Grosberg, Ph.D., Associate Professor  
Milton Hildebrand, Ph.D., Professor Emeritus  
Everett W. Jameson, Jr., Ph.D., Professor Emeritus  
Roger J. Leslie, Ph.D., Assistant Professor  
Marc S. Mangel, Ph.D., Professor  
Peter R. Marler, Ph.D., Professor  
Milton A. Miller, Ph.D., Professor Emeritus  
3.4 Brian Mullaney, Ph.D., Professor  
Jeanette E. Natzke, Ph.D., Assistant Professor  
Richard L. Nuccitelli, Ph.D., Professor  
Lauren E. Rosenberg, Ph.D., Professor Emeritus  
Robert L. Rudd, Ph.D., Professor Emeritus  
George W. Salt, Ph.D., Professor  
Thomas W. Schoener, Ph.D., Professor  
Jonathan M. Scholey, Ph.D., Assistant Professor  
H. Bradley Shaffer, Ph.D., Associate Professor  
Arthur M. Shapiro, Ph.D., Professor  
1 Judy Stamps, Ph.D., Professor  
Catherine A. Toft, Ph.D., Associate Professor  
Kenneth E. F. Watt, Ph.D., LL.D., Professor  
Martin Wilson, Ph.D., Associate Professor  
Stephen L. Wolfe, Ph.D., Lecturer Emeritus

#### The Major Programs

The Zoology major presents animal biology from the subcellular and molecular to the community and ecosystem levels. As a basic life science major, it is suitable for students who plan to pursue a professional career in Zoology, to do graduate work in Zoology or another life science, or who intend to apply to professional schools in the health sciences. The major is structured to insure breadth of preparation while still allowing individualization of each student's program in accordance with his or her interests.

Students majoring in Zoology in the College of Letters and Science may petition the Dean of the College to receive credit toward the 64 upper division units required for the degree for certain courses in organic chemistry that have been taken at other institutions prior to first enrollment at UC Davis and that are judged by the Chemistry Department to cover substantially the same material as upper division courses in the subject at UC Davis.

**Choice of College.** The Bachelor of Arts and the Bachelor of Arts and Science degrees are offered only in the College of Letters and Science. The Bachelor of Science degree is offered in both the College of Letters and Science and the College of Agricultural and Environmental Sciences.

#### A.B. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>41-45</b>
Chemistry 1A, 1B, 8A, 8B .....	16
Biological Sciences 1A, 1B, 1C .....	15
Mathematics 16A-16B or Statistics 102 .....	4-6
Physics 1A-1B or 5A-5C .....	6-8

**Depth Subject Matter** .....36

Genetics 100 .....4  
Zoology 130 or 121A-121B .....4-8  
One course from Zoology 148, Genetics 103, Geology 107, 111A, Anthropology 151 .....3-4  
Additional upper division course work in biological science to achieve a total of 36 units or more .....20-25  
Include at least (a) 15 units in zoology, and (b) one course from two of the four Areas of Study shown below.

**Total Units for the Major** .....77-81

#### Recommended

Geology 3; Physics 5C; Biochemistry 101A-101B or Physiological Sciences 101A-101B.

#### B.S. Major Requirements:

	UNITS
<b>Preparatory Subject Matter</b> .....	<b>54-59</b>
Chemistry 1A, 1B, 1C .....	15
Chemistry 8A-8B or 128A-128B-128C .....	6-9
Biological Sciences 1A, 1B, 1C .....	15
Mathematics 16A-16B or 21A-21B .....	6-8
Physics 5A, 5B, 5C .....	12

**Depth Subject Matter** .....49

Biochemistry 101A-101B or Physiological Sciences 101A-101B .....6-7  
Genetics 100 .....4  
Statistics 102 .....4  
Zoology 130 or 121A-121B .....4-8  
One course from Zoology 148, Genetics 103, Geology 107, 111A, Anthropology 151 .....3-4  
Additional upper division course work in biological science to achieve a total of 49 or more units .....22-28  
Include at least  
(a) 15 units in zoology,  
(b) 6 units (or 18 hours) of laboratory, and  
(c) one course from three of the four Areas of Study shown below.

#### Breadth Subject Matter

*College of Agricultural and Environmental Sciences students* .....23  
English and/or rhetoric .....7  
Social sciences and/or humanities .....16  
See also the College section for additional requirements.

*College of Letters and Science students:*

Refer to the College section for a description of requirements to be completed in addition to the major.

**Total Units for the Major** .....103-108

#### Recommended

Chemistry 5, Mathematics 16C or 21C, Geology 3.

#### Areas of Study

1. *Ecology and behavior:* Zoology 125, 147, 149, 155; Environmental Studies 100.
2. *Systematics, morphology, and natural history:* Zoology 105, 106, 112, 133, 133L, 136, 136L, 137, 137L; Entomology 100.
3. *Developmental biology:* Zoology 100, 100L, 101.
4. *Physiology:* Zoology 121C, 142, 142L, 143; Physiology 110, 110L.

**Note:** A maximum of 5 units of variable-unit courses (numbered 192, 198, and 199) may be applied to upper division elective unit requirements. Zoology majors may not substitute course 192 for the upper division laboratory requirement. Courses numbered

197T are not applicable to the upper division elective unit requirement.

**Biological Sciences Electives.** The following courses are acceptable toward the fulfillment of the upper-division biological sciences requirement in the major programs and may be selected without adviser approval. Other elective courses are approved on an individual basis by petition through an adviser.

Anatomy 100  
 Anthropology 151, 152, 153, 154A, 154B, 155, 156  
 Biochemistry and Biophysics, all upper division courses  
 Biological Sciences, all upper division courses  
 Botany, all upper division courses  
 Chemistry 107A, 107B  
 Clinical Pathology 101, 101L, 102  
 Entomology, all upper division courses except 110, 115A, 115B  
 Environmental Studies 110, 116, 121, 123, 150C, 151, 151L  
 Genetics, all upper division courses  
 Geology 106, 107, 107L, 111A, 111B, 145, 146, 150C  
 Microbiology, all upper division courses  
 Nematology 110  
 Nutrition 110, 111, 114  
 Physiological Sciences 101A, 101B  
 Physiology, all upper division courses  
 Psychology 108, 129, 134, 150  
 Veterinary Microbiology and Immunology 126, 126L, 128, 132  
 Wildlife and Fisheries Biology 120, 120L, 121

**Major Advisers.** Students transferring to Davis from another institution and majoring in Zoology 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 Zoology Department Office for adviser assignment. Substitutions of courses not on the above list for major requirements are arranged through the adviser.

Preprofessional students should establish contact with the Health Sciences Advising Office, in South Hall, to learn what specific courses are required on their transcripts.

**Teaching Credential Subject Representative.** Students planning for a teaching career should consult the Department of Education in regard to preparation for certification. See also the section on the Teacher Education Program.

**Graduate Study.** The Department of Zoology offers programs of study and research leading to the M.A. and Ph.D. degrees. For detailed information regarding graduate study write to the Graduate Adviser, Department of Zoology. See also the Graduate Division section in this catalog.

**Graduate Advisers.** P.B. Armstrong, R.K. Grosberg, B. Mulloney, J.E. Natzle, H.B. Shaffer, C.A. Toft.

## Courses in Zoology

### Lower Division Courses

#### 2. General Zoology

This course has been cancelled and replaced by Biological Sciences 1B.

#### 2L. Laboratory in General Zoology

This course has been cancelled and replaced by Biological Sciences 1B.

#### \*10. Concepts of Zoology (3) III. Watt

Lecture—3 hours. Principal issues of modern zoology for nonscience majors. Diversity, its causes and consequences, self-stabilization, evolution, levels of organization. Implications of zoology for the human situation.

#### 92. Internship (1-12) I, II, III. The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: lower division standing and consent of instructor. Work-learn experience off and on campus in all subject areas offered in the Department of Zoology. Internships supervised by a member of the faculty. (P/NP grading only.)

**99. Special Study for Lower Division Students (1-5) I, II, III. The Staff (Chairperson in charge) (P/NP grading only.)**

### Upper Division Courses

#### 100. Embryology (4) I. Armstrong; II. The Staff; III. Erickson

Lecture—4 hours. Prerequisite: Biological Sciences 1A, 1B; concurrent enrollment in course 100L. Events and mechanisms of embryonic development, including fertilization, morphogenesis, cell differentiation and organogenesis, with emphasis on vertebrates.

#### 100L. Laboratory in Vertebrate Embryology (1) I. Armstrong; II. The Staff; III. Erickson

Laboratory—3 hours. Prerequisite: course 100 (concurrently). Comparative analysis of the embryonic development of vertebrates. (P/NP grading only.)

#### 101. Advanced Developmental Biology (4) II. Erickson, Natzle, Nuccitelli

Lecture—2 hours; laboratory—6 hours; report. Prerequisite: courses 100, 100L; Biochemistry 101A, 101B; consent of instructor. Lectures in modern topics in developmental biology will be followed by sophisticated laboratory exercises that demonstrate lecture topics. Students conduct their own independent studies during last four weeks of quarter. A written report due at end of quarter.

#### \*102. Senior Colloquium in Developmental Biology (3) II. Grey

Lecture—1 hour; seminar—2 hours. Prerequisite: course 100 with a grade of B or better; consent of instructor. Analysis of major topics in developmental biology, including fertilization and activation of development, morphogenesis, cell differentiation, and pattern formation. Limited enrollment.

#### 105. Phylogenetic Analysis of Vertebrate Structure (4) I. The Staff

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B. The structure of the classes and subclasses of vertebrates is described and interpreted in terms of phylogeny.

#### \*106. Functional Analysis of Vertebrate Structure (3) II.

Lecture—2 hours; laboratory—4 hours. Prerequisite: Biological Sciences 1A, 1B. Mechanical principles are used to interpret the structure associated with supporting the body, running, digging, climbing, swimming, flying, and feeding. Emphasis is on the skeletal system of mammals.

#### \*106P. Project on the Functional Analysis of Vertebrate Structure (1) II.

Project report. Prerequisite: course 106 (may be taken concurrently). A paper of about 2,000 words, or a dissection with explanation, analyzing the function of a selected aspect of vertebrate structure.

#### 112. Invertebrate Zoology (4) II. Grosberg, Ellers

Lecture—4 hours. Prerequisite: Biological Sciences 1A, 1B; course 112L (concurrently); courses in systematics, ecology, and evolution recommended. Survey of the invertebrate phyla emphasizing aquatic forms and focusing on morphology, development, natural history, and phylogenetic relationships.

#### 112L. Laboratory for Invertebrate Zoology (3) II. Grosberg, Ellers

Discussion—1 hour; laboratory—6 hours. Prerequisite: Biological Sciences 1A, 1B; course 112 concurrently. Field and laboratory experience with representative members of the invertebrate phyla discussed in course 112. Emphasis on comparative morphology, natural history, ecology, and behavior of living invertebrates.

#### 121A. Cell Biology (4) I. Nuccitelli

Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in biochemistry (may be taken concurrently). An introduction to modern cell biology with emphasis on cell ultrastructure, membranes and organelles, the cytoskeleton, and bioenergetics.

#### 121B. Cell Biology (4) II. Natzle

Lecture—3 hours; discussion—1 hour. Prerequisite: introductory course in biochemistry; introductory course in genetics recommended. Discussion of modern cell biology with emphasis on the structure of the nucleus, cell cycle, information transfer, the

immune system, and cancer cell biology. Students who have had Zoology/Botany 130 may receive only 2 units for course 121B.

#### \*121C. Advanced Cell Biology (4) III. Baskin

Lecture—3 hours; extensive reading and research report. Prerequisite: Biochemistry 101B; Mathematics 16B. Physical-chemical basis of cell structure and function, including a discussion of aspects of biological thermodynamics, the ionic basis of excitation, and the molecular basis of contractility.

#### 121L. Cell Biology Laboratory (3) III. L. Crowe

Lecture—1 hour; laboratory—6 hours. Prerequisite: Biochemistry 101A-101B; courses 121A-121B recommended, or consent of instructor. Exercises illustrating the principles of cell biology; emphasis on individual research employing one or more advanced techniques.

#### \*122. Histology (4) II. Crowe

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 121A; working knowledge of elementary physiology is essential. Functional morphology of animal tissues and organs. Emphasis is placed on the use of structural studies in elucidating mechanisms underlying physiological and metabolic processes.

#### \*122L. Histology Laboratory (3) III. Crowe

Laboratory—6 hours. Prerequisite: course 122 (may be taken concurrently). Laboratory practice in histo- and cyto-techniques; use of such techniques in research. Design and execution of a research project is required.

#### 125. Animal Ecology (3) I. The Staff; II. Schoener and Toft; III. Watt

Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B, 1C. General survey of the concepts of animal ecology.

#### 130. Survey of Cell Biology (4) I. Leslie; II. Falk (Botany), Theg (Botany)

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 8B or 128C; introductory course in biochemistry strongly recommended. Survey of cell biology presenting the structure and function of the major cellular organelles. Topics discussed include energy metabolism, motility, gene expression, and membranes. Currently popular methodologies used in cell biology will be presented in a discussion section. Not open to students who have received credit for Zoology 121A or 121B. (Same course as Botany 130.)

#### \*133. Patterns in Vertebrate Biology (3) II.

Lecture—3 hours. Prerequisite: Biological Sciences 1A, 1B. Vertebrate thermoregulation and water balance, circadian and circannual activity, communication, breathing, movements and feeding patterns.

#### \*133L. Systematics and Field Studies in Cold-Blooded Vertebrates (3) III.

Laboratory—6 hours; field trips. Prerequisite: course 133 and consent of instructor. Systematic and faunal studies on poikilothermous vertebrates. Offered in odd-numbered years.

#### 134. Herpetology (3) III. Shaffer

Lecture—2 hours; term paper. Prerequisite: Biological Sciences 1A, 1B; course 148 recommended. The world-wide diversity of amphibians and reptiles with emphasis on behavior, ecology, functional morphology, and evolutionary history. Offered in odd-numbered years.

#### 134L. Herpetology Laboratory (1) III. Shaffer

Laboratory—3 hours; two weekend field trips. Prerequisite: Biological Sciences 1A, 1B; course 134 concurrently. Diagnostic characteristics and functional attributes of amphibians and reptiles, emphasizing ecological, biogeographic and phylogenetic patterns. Field trips will acquaint students with techniques for identifying and studying amphibians and reptiles under natural conditions. Offered in odd-numbered years.

#### 136. Mammalogy (2) I. Jones

Lecture—2 hours. Prerequisite: course 125 or equivalent general course in ecology. Systematics, life history, reproduction, distribution, and physiology of wild mammals.

#### 136L. Mammalogy Laboratory (3) I. Jones

Laboratory—6 hours; extensive weekend field-trips.

Prerequisite: course 125 or 136, and consent of instructor. Systematics of California mammals; techniques of study in professional mammalogy. May be taken concurrently with course 136.

**137. Ornithology (2) III.** The Staff

Lecture—2 hours. Prerequisite: course 125 or the equivalent course in ecology. Systematics, distribution, physiology, and population dynamics of birds. Students who have had Wildlife and Fisheries Biology 111 may not receive credit for this course.

**137L. Ornithology Laboratory (3) III.** The Staff

Laboratory—6 hours. Prerequisite: course 125 or 137 (may be taken concurrently) and consent of instructor. Individual study and field trips strongly emphasized. Systematics, behavior, population dynamics, and reproduction of California birds.

**\*138. Ecology of Tropical Latitudes (3) III.** Shapiro  
Lecture—3 hours. Prerequisite: any one of the following: Biological Sciences 1A, 1B, or 10, Botany 10, Geography 2 or 2G, or Wildlife and Fisheries Biology 10. 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. General Education credit: Nature and Environment/Non-Introductory. Recommended GE preparation: Biological Sciences 10, Botany 10, or Wildlife and Fisheries Biology 10.

**141. Principles of Systematic Zoology (3) III.**

Shapiro

Lecture—2 hours; biweekly research projects. Prerequisite: Biological Sciences 1B or 1C; course 148 or Genetics 103 recommended. Historical background, philosophical rationale, contemporary approaches, and working rules of animal biosystematics, including International Code of Zoological Nomenclature.

**\*142. Invertebrate Physiology (4) II.** Crowe

Lecture—3 hours; term paper; individual conferences. Prerequisite: course 112, Chemistry 1A, 1B, Physics 5C; Biochemistry 101A, 101B recommended. Comparative physiology of invertebrate organ systems.

**\*142L. Invertebrate Physiology Laboratory (3) II.**

Crowe

Laboratory—6 hours (includes research project). Prerequisite: course 142 (may be taken concurrently). Experiments on the physiological mechanisms of invertebrate organ systems. Design and execution of a research project.

**143. Neurobiology (4) III.** Wilson

Lecture—3 hours; extensive reading. Prerequisite: Biological Sciences 1A, 1B, 1C; Biochemistry 101A-101B or the equivalent. Neuronal structure; impulse transmission; synapses; transmitters and transmitter pharmacology; receptors; growth and differentiation of neurons and nervous systems; genetics of behavior.

**\*143L. Neurobiology Laboratory (6) III.** Mulloney, Wilson

Lecture—1 hour; discussion—1 hour; laboratory—12 hours. Prerequisite: course 143 and consent of instructor; Physics 5C recommended. Students will learn to record action potentials and synaptic circuits, to interpret quantitatively their recordings, and to use vital dyes and intracellular stains. Limited enrollment.

**147. Zoogeography (4) I.** Shapiro

Lecture—3 hours; term paper. Prerequisite: Biological Sciences 1A, 1B. Movements of terrestrial animals. The role of geologic, climatic, and biologic changes in the geographic distribution of animals.

**148. Animal Phylogeny and Evolution (4) II.**

Griesemer, Shapiro, Shaffer

Lecture—4 hours. Prerequisite: Biological Sciences 1A, 1B; Genetics 100; ecology and biochemistry recommended. Introduction to current evolutionary theory. The place of evolution as the central unifying theory to biology will be emphasized.

**149. Evolution of Ecological Systems (4) III.**

Shapiro

Lecture—3 hours; term paper. Prerequisite: course 125 or Environmental Studies 100 (or the equivalent)

and course 148 or Genetics 103 (or the equivalent). Evolution as an organizing force in natural communities. Coadaptation in trophic and competitive relationships. Ecology of polymorphisms, clines, and speciation.

**155. Behavior of Animals (5) II.** Marler

Lecture—3 hours; discussion—1 hour; term paper. Prerequisite: Biological Sciences 1A, 1B. Basic principles, mechanisms and evolution of behavior, with special reference to the significance of behavior under natural conditions. Students who have had Animal Science 104 may receive only 4 units of credit for this course.

**189. Introduction to Biological Research (1) I, II, III.** The Staff (Chairperson in charge)

Discussion—1 hour. Prerequisite: upper division standing in Zoology 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 3 units. (P/NP grading only.)

**190. Undergraduate Seminar in Zoology (2) I.**

Shapiro; III. Deamer

Seminar—2 hours. Prerequisite: upper-division standing in biological sciences or related discipline. Student reports on current topics in zoology, broadly construed, 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.)

**192. Internship (1-12) I, II, III.** The Staff (Chairperson in charge)

Laboratory—3-36 hours. Prerequisite: completion of 84 units and consent of instructor. Work-learn experience off and on campus in all subject areas offered in the Department of Zoology. Internships supervised by a member of the faculty. (P/NP grading only.)

**194HA-194HB-194HC. Research Honors in Zoology (2) I, II, III.** The Staff (Chairperson in charge)

Laboratory—6 hours. Prerequisite: students majoring in Zoology who have completed 135 units and qualify for the honors program (as defined in the current catalog). Zoology majors pursue intensive research under 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.)

**197T. Tutoring in Zoology (1-5) I, II, III.** The Staff (Chairperson in charge)

Discussion—1-2 hours. Prerequisite: upper division standing. Experience in teaching zoology under guidance of staff. (P/NP grading only.)

**198. Directed Group Study (1-5) I, II, III.** The Staff (Chairperson in charge)

(P/NP grading only.)

**199. Special Study for Advanced Undergraduates (1-5) I, II, III.** The Staff (Chairperson in charge)

(P/NP grading only.)

**Graduate Courses**

**200. Current Techniques in Cell Biology (2) I.**

Nuccitelli

Lecture—2 hours. Current techniques used in cell biology research including microscopy, spectroscopy, electrophysiology, immunochemistry, histology, organelle isolation, calorimetry, tissue culture and gel electrophoresis. Lectures presented by experts on each technique, with emphasis on pitfalls to avoid when using the technique. (S/U grading only.) (Same course as Cell and Developmental Biology 200.)

**200LA. Cell and Developmental Biology Laboratory (3) I, II, III.** The Staff (Chairperson in charge)

Laboratory—18 hours (five weeks only). Prerequisite: course 200 (may be taken concurrently). One five-week assignment in research laboratory of a Cell and Developmental Biology Graduate Group member. Individual research problems with emphasis on methodological/procedural experience and experi-

mental design. (Same course as Cell and Developmental Biology 200LA.)

**200LB. Cell and Developmental Biology Laboratory (6) I, II, III.** The Staff (Chairperson in charge)

Laboratory—18 hours (two five-week assignments). Prerequisite: course 200 (may be taken concurrently). Two five-week assignments in research laboratories of Cell and Developmental Biology Graduate Group members. Individual research problems with emphasis on methodological/procedural experience and experimental design. (Same course as Cell and Developmental Biology 200L.)

**\*202. Biomathematics (6) III.** Watt

Lecture—4 hours; laboratory—6 hours. Prerequisite: two courses in calculus; three courses in statistics. Mathematical aspects of physiology, ecology, and epidemiology; development and testing of models; mathematical description of biological systems; measurement, analysis, simulation and optimization in biology.

**203. Global and Regional Modeling (6) II.** Watt

Lecture—1 hour; discussion—1 hour; seminar—3 hours; laboratory—3 hours. Prerequisite: Mathematics 16A-16B; Statistics 106 and 108 or 131A-131B-131C; FORTRAN. Use of statistical analysis of data, mathematical modeling, and computer simulation of the world or regions to provide basis for policy recommendations and new legislation.

**204. Cellular Basis of Morphogenesis (4) III.** Armstrong

Lecture—3 hours; term paper. Prerequisite: course 100. Development of form and structure; morphogenetic movement, mechanisms of cellular motility, cell adhesion, intercellular invasion, interaction of cells and tissues in development. Offered in odd-numbered years.

**205. Pattern Formation (4) II.** Nuccitelli

Lecture—3 hours; term paper. Prerequisite: course 100 or 121A or the equivalent, and consent of instructor. Morphology and mechanism of pattern formation beginning with ooplasmic segregation. Emphasis will be on cell polarity but some multicellular systems will also be covered. Offered in odd-numbered years.

**206. Mechanisms of Organogenesis (4) II.** Erickson

Lecture—3 hours; term paper. Prerequisite: course 100. Course will demonstrate the various means by which several cell types become organized and differentiate to form a functional unit, using five selected organ systems. Offered in even-numbered years.

**\*207. Topics in Advanced Ornithology (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: graduate standing; course 137 or the equivalent. Advanced training in field of ornithology. Specific ecological and morphological areas of avian study. Laboratory oriented toward the breeding ecology of birds in the Central Valley area of California, but will also deal with aspects of avian anatomy.

**212. Topics in Invertebrate Evolution (2) III.**

Grosberg

Seminar—2 hours. Prerequisite: graduate standing or consent of instructor and course 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.)

**\*222. Topics in Advanced Ecology (2) I.** Schoener  
Lecture—1 hour; seminar—1 hour. Prerequisite: Ecology 204 or the equivalent. Each year, some topic of current research interest will be critically reviewed. Possible topics include feeding strategies, island ecology, competition. Time will be divided between lecture and student presentations. May be repeated for credit when a different topic is studied. (S/U grading only.)

**223. Modeling In Behavioral and Evolutionary Ecology (3) II.** Mangel

Lecture—3 hours. Prerequisite: graduate standing or consent of instructor; course 125 or 155, or the equivalent; Mathematics 131 or Statistics 130A, or

the equivalent. Advanced course in theoretical behavioral and evolutionary biology to introduce students to methods that can be used to characterize the fitness associated with different behavioral and developmental adaptations. Will enable students to develop and apply models. Offered in odd-numbered years.

**225. Biology of Fertilization** (3) III. Grey

Lecture—2 hours; term paper. Prerequisite: course 121A or the equivalent and consent of instructor. The morphology, physiology and biochemistry of gametes and the mechanism and consequences of their union. Offered in even-numbered years.

**226. Cell and Molecular Biology of Cancer** (1) I.

Armstrong

Lecture—2 hours (first five weeks of quarter). Prerequisite: course 100 or one course from courses 121A, 121B, or 130; or Biochemistry 101A-101B or Physiological Sciences 101A-101B. Analysis at the cellular and molecular levels of the regulation of normal and neoplastic growth, tumor dissemination, identification and characterization of oncogenic agents, characterization of oncogenes and anti-oncogenes.

**\*228. Experimental Animal Ecology** (3) II.

Lecture—2 hours; 3 weekend field trips, 2 written critiques. Prerequisite: course in animal ecology. Discussion of means of generating ecological hypotheses and methods of testing those hypotheses. Topics will include analysis of field observation, experimental design in both field and laboratory, and interpretation of results. Limited enrollment.

**\*236. Muscle Physiology** (4) I. Baskin

Lecture—2 hours; discussion—1 hour; term paper. Prerequisite: Biochemistry 101A-101B and Mathematics 16B or 21B; or consent of instructor. The physical and chemical aspects of muscle function.

**\*240. Topics in Cell Biology** (3) I. Deamer

Lecture—2 hours; discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Discussion and review of current topics in the area of cell biology. May be repeated for credit.

**241. Membrane Biology** (3) II. Deamer

Lecture—3 hours. Prerequisite: courses 121A-121B or Biochemistry 101A-101B recommended, or consent of instructor. Course emphasizes biological aspects of membrane function and structure. The general approach will be to discuss cell biology from the viewpoint of membranous components of cells. Offered in odd-numbered years.

**242. Research Conference in Cell Biology** (1) I.

Natzle; II. Scholey; III. Deamer

Seminar—1 hour. Prerequisite: consent of instructor. Presentation and critique of faculty and graduate student research in cell biology. May be repeated for credit. (S/U grading only.)

**243. Topics in Cellular and Behavioral Neurobiology** (2) III. Wilson

Seminar—2 hours. 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.)

**252. Ecology of Arthropod Populations** (2) II. Toft

Lecture—1 hour; seminar—1 hour; student presentations. Prerequisite: course 125 or the equivalent; graduate-level background in ecology recommended. In-depth examination of the ecology of arthropod populations, emphasizing population interactions particularly: competition, predation (including parasitism), mutualism. Topics will vary from year to year. Offered in even-numbered years. (S/U grading only.)

**254. Ecology of Parasites** (2) I. Toft

Lecture—1 hour; seminar—1 hour. Prerequisite: course 125 or Entomology 104 or the equivalent; graduate-level background in ecology recommended. Population dynamics of parasites and parasitoids, emphasizing species of ecological importance but also including species of medical and economic interest. Offered in even-numbered years. (S/U grading only.)

**266. Seminar in Cell Biology** (2) III. Leslie

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 on the molecular and cellular levels of biological systems.

**269. Research Conference in Developmental Biology** (1) I, II, III. Erickson, Nuccitelli

Seminar—1 hour. Prerequisite: consent of instructor. Presentation and critique of faculty and graduate student research in developmental biology. Intended primarily for graduate students. (S/U grading only.)

**270. Research Conference in Evolutionary Biology** (1) I, II, III. Shaffer, Grosberg

Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and evaluation of current literature and ongoing research in evolutionary biology. (S/U grading only.)

**283. Neurobiological Literature** (1) I. Mulloney; II, III. Wilson

Seminar—1 hour. Prerequisite: consent of instructor. Critical presentation and analysis of recent journal articles in neurobiology. (S/U grading only.)

**287. Seminar in Animal Behavior** (2) III. The Staff

Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on the principles and recent developments in invertebrate and vertebrate animal behavior.

**290. Current Topics in Zoology** (1) I, II, III. The Staff (Chairperson in charge)

Seminar—1 hour. Prerequisite: graduate standing and consent of instructor. Seminars presented by guest lecturers describing their research activities. May be repeated for credit. (S/U grading only.)

**290C. Research Conference in Zoology** (1) I, II, III.

The Staff (Chairperson in charge)

Discussion—1 hour. Prerequisite: graduate standing in Zoology and/or consent of instructor. Presentation and discussion of faculty and graduate student research in biology. May be repeated for credit. (S/U grading only.)

**\*291. Current Topics in Developmental Biology** (1)

III. Nuccitelli

Seminar—2 hours (alternate weeks). Seminar on current topics in developmental biology will be presented and discussed. Speakers will be drawn from Universitywide system, and outside the system when feasible. (S/U grading only.)

**292. Seminar in Development** (2) II. Erickson, Armstrong

Seminar—2 hours. Prerequisite: consent of instructor. Reports and discussion on embryology, morphogenesis, and developmental mechanisms.

**293. Seminar in Invertebrate Zoology** (2) II. Crowe

Seminar—2 hours. Prerequisite: course 112, or consent of instructor. Critical review of the literature in selected topics and taxa in the invertebrates. Open to qualified undergraduates.

**\*294. Seminar in Animal Ecology** (3) I.

Seminar—3 hours. Prerequisite: course 125 and graduate standing. Readings and discussions of advanced topics in the population and community ecology of animals.

**\*295. Seminar in Marine Invertebrate Ecology** (2) II.

Seminar—2 hours. Prerequisite: course 112 and consent of instructor. Reports and discussion on current topics in marine invertebrate ecology. Open to qualified undergraduates.

**296. Seminar in Geographical Ecology** (2) I.

Shapiro

Seminar—2 hours. Prerequisite: course 125 or 148 or Genetics 103 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. (S/U grading only.) May be repeated for credit.

**298. Group Study** (1-5) I, II, III. The Staff (Chairperson in charge)

(S/U grading only.)

**299. Research** (1-12) I, II, III. The Staff (Chairperson in charge) (S/U grading only.)

**Professional Course**

**390. Methods of Teaching Zoology** (2) I, II, III. The Staff (Chairperson in charge)

Lecture—1 hour; discussion—1 hour. Prerequisite: graduate standing and consent of instructor. Practical experience in the methods and problems of teaching zoology and related biological sciences. Includes analyses of texts and supporting material, discussion of teaching techniques and preparing and conducting of laboratory and discussion sections. May be repeated for credit for a maximum of 8 units. (S/U grading only.)

## OTHER USEFUL PUBLICATIONS

### Undergraduate Admissions Circular

A complete statement of the University's requirement for admission as an undergraduate.

*Office of Undergraduate Admissions, 175 Mrak Hall, or from your high school or community college counselor. (No charge.)*

### Answers for Transfers

A question-and-answer booklet for students who want to attend a community college before transferring to the University. Gives information about University admission requirements, costs, financial aid, and advice on planning your program and transferring courses to UC.

*Available from University Admissions Offices and Relations with Schools Offices, and at community college counseling offices. (No charge.)*

### UC Davis Poster/Calendar

Information for prospective students about UCD programs and activities, plus a wall poster and calendar marking important dates and UC application deadlines.

*Office of Undergraduate Admission, 175 Mrak Hall. (No charge.)*

### Graduate Announcement, UC Davis

Brief descriptions of the graduate programs and research resources including admission requirements, procedures and dates for filing applications, degrees offered, fields of study, degree requirements, fees and expenses, financial aid and student services, and sources of additional information. Course descriptions are not included.

*Dean of the Graduate Division, 252 Mrak Hall. (No charge.)*

### College of Engineering Bulletin

A detailed description of College of Engineering programs, majors, and course offerings.

*College of Engineering Dean's Office, 2132 Bainer Hall. (No charge.)*

### School of Law Catalog

A detailed description of admissions requirements, academic programs, courses of instruction, faculty, law school activities, and general information about the School of Law.

*Office of Admissions, School of Law, University of California, Davis 95616 (No charge.)*

### Graduate School of Management Bulletin

Admission requirements, description of academic programs, courses of instruction, faculty, and general information.

*Graduate School of Management, 308 Voorhies Hall, University of California, Davis 95616. (No charge.)*

### Announcement of the School of Veterinary Medicine

A complete statement of the School of Veterinary Medicine requirements for admission into the Doctor of Veterinary Medicine program.

*Office of Associate Dean—Student Services, School of Veterinary Medicine, University of California, Davis 95616. (No charge.)*

### Class Schedule and Room Directory

Issued quarterly. Lists times and place of meeting for specific classes, instructors, and units of credit. Also contains information on registration and enrollment in classes.

*Available for 50 cents at the UCD Bookstore. (Not available by mail.)*

### Summer Sessions Bulletin

Complete information about summer session courses and instruction.

*Office of the Summer Sessions, 44 Mrak Hall. (No charge.)*

### Educational Opportunity Program (EOP) Brochure

Information on applying to the EOP program; application dates.

*EOP, Office of Admissions, 175 Mrak Hall. (No charge.)*

### Financial Aid at UCD

Information on financial aid; grants, loans, and work-study at UCD.

*Financial Aid Office, North Hall. (No charge.)*

### People and Places at UCD

The student orientation handbook giving descriptions of campus services, activities, and information sources.

*Available free from Advising Services, South Hall. (Not available by mail.)*

### Student Directory

Student directory, combined with information on ASUCD activities and services and campus organizations.

### Student Viewpoint

Student-compiled evaluations of courses and professors by in-class surveys, ASUCD Catalog of student services and organizations and STUDENT Directory of student names, addresses and phone numbers.

*Student Viewpoint Office, 13 Freeborn. (No charge. Available by mail.)*

### Venture

University Extension quarterly catalog. Complete information about Unex courses, including times and location.

*University Extension, 1333 Research Park Drive. (No charge.)*

### City of Davis Information

Chamber of Commerce, 228 B Street, Davis, CA 95616.

## GLOSSARY

**Academic Senate** The faculty governing body of the University. Consists primarily of the regular faculty and certain administrative officers. Determines conditions for the admission of students and for granting certificates and degrees, develops educational policy, and authorizes and supervises all courses in the University.

**Academic year** Starts at the beginning of the Fall Quarter, ends at the close of the Spring Quarter; does not include summer sessions.

**Add/Drop Petition** A petition used when you want to add, change or drop a course to your study list. (Sometimes referred to as an Add/Drop card.)

**Advanced degree** Any degree beyond the bachelor's degree.

**AOB** Stands for "Academic Office Building," a building that houses administrative and academic offices. AOB is the informal designation until the building is officially named.

**ASUCD (Associated Students of the University of California, Davis)** The undergraduate student body governing organization at UCD.

**College** A subdivision of the campus instructional system (e.g., College of Letters and Science). The colleges are further divided into departments (e.g., English, Zoology, etc.) which offer specialized curricula.

**Continuing student** One who was registered for the immediately preceding term. (A student returning from PELP is also considered continuing.)

**Credential** A license for public school teaching in California. Programs offering the multiple-subject (elementary) or single-subject (high school) teaching credential are supervised by the Graduate Division in coordination with the Department of Education.

**Curriculum** (plural, curricula) All the courses of study offered by the University. May also refer to a particular course of study (major) and the courses in that area.

**Directed group study** A course set up on a one-time basis for a group of students in a subject area where no regular courses have been established.

**Discipline** A branch of knowledge or teaching. Typically refers to an area of study or a major field.

**Enrollment** Signing up for a class, either through preenrollment or the submission of an Add card.

**Good standing** An undergraduate student who has at least a 2.0 grade-point average in all work completed at the University of California, and who has maintained his or her minimum unit progress requirement for UCD, is considered a student in good standing.

**Grade-point average (GPA)** The GPA is computed by dividing the total number of grade points accumulated by the number of course credits taken. Courses taken P/NP or S/U, or outside of the UC system are not considered (exception, see Incomplete or I grade).

**Graduate student** A student who is enrolled in the Graduate Division for an advanced degree. Graduate courses at UCD are numbered 200-299.

**GSA (Graduate Student Association)** The elected representative body for graduate students at UCD.

**Independent study** A course arranged for an individual student who shares with an instructor an academic interest which cannot be accommodated within formal course structure.

**Independent Study Program** A program intended to provide an opportunity for upper division students to pursue a special interest for a full quarter.

**International student** A student enrolled in nonresident status who is a citizen or resident of another country.

**Lower Division** Freshman and sophomore standing at UCD (83.9 or fewer units completed); also refers to UCD courses numbered from 1 through 99.

**Major** The area of academic concentration in which the degree is conferred.

**Matriculate** To enroll for a degree in a college or school.

**Minimum progress** Refers to the number of units a student must have completed and passed by the end of a specific number of quarters at UCD.

**New student** A student beginning work at any level at UCD is considered to be a new student. After one quarter's attendance at Davis, a student is considered to be a continuing student. Graduate students who were enrolled at UCD as undergraduates are considered to be new students for their first quarter of graduate work.

**Part-time student** A student enrolled in the Part-Time Degree Program.

**Passed/Not Passed (P/NP) option** A system used to encourage undergraduate students to experiment in fields outside of their major areas. The "P" grade is given for a grade of C- or better. P/NP grades are not included in a student's grade-point average, but the units are counted toward the 180-unit graduation requirement.

**PELP** Any student, new or continuing, can interrupt formal study in a given quarter (or for a maximum of one academic year) by enrolling in the Planned Education Leave Program before the tenth day of instruction. You will not be eligible for most University services, but student employment and counseling services and faculty advising are available. PELP ensures your space in registration for the quarter following your leave.

**Petition** A request, usually written on a standard form, to adjust a study list or curriculum to fit an individual situation. Also, a request for an exception to a policy or regulation.

**Photo ID card** A plasticized identification card with a photo provided to each new student. Upon payment of fees a validation sticker is issued to be affixed to this card. The then validated card serves to identify the carrier as a UCD student. There is a replacement fee if lost.

**Prerequisite** A necessary condition for enrollment in a course or a major. Prerequisites for courses usually consist of a previous course or courses in a related subject and/ or the instructor's permission. Prerequisites are indicated in the course descriptions.

**Professional school student** A student enrolled in the School of Law, Management, Medicine, or Veterinary Medicine.

**Probation** An indication that performance is below standard because of academic deficiencies; a trial period in which a student is permitted to redeem failing grades or deficient units.

**Quarter** A subdivision of the academic year at UCD, consisting of three 10-week terms (fall, winter, and spring quarters). The two 6-week summer sessions provide a quarter's work in a more concentrated format, but are not considered regular quarters. (Attendance at both summer sessions, however, may count as one quarter in residence.)

**Quarter units** Academic work at the University is measured by quarter units of credit which determine the amount of time a student has formally devoted to a given subject. To convert these units to semester units multiply by 2/3; from semester to quarter units multiply by 3/2.

**RA (Research Assistant)** RA's are graduate students who do research on a part-time basis while pursuing their degrees. They are selected, trained, and supervised by senior faculty members in departments.

**RA (Resident Adviser)** RA's are student staff members of the Student Housing Office who help plan, coordinate, and conduct educational and social programs to meet residence hall students interests and needs.

**RD (Resident Director)** RD's are full-time professional staff members of the Student Housing Office. They help residence hall students with academic, housing, and personal problems, and supervise and train student Resident Advisers.

**Registration** The payment of fees for a term or summer session. Registration also typically involves giving address information and having a photo ID made. By registering, the student informs the University of intent to begin or continue attendance.

**Registration card** (see Photo ID card).

**Regular session** Refers to fall, winter, and spring quarters. Students in the School of Medicine also attend a summer quarter. (See also Semester.)

**Repeated courses** Courses in which a grade of D or F for undergraduate students and C, D, or F for graduate students can be repeated for a letter grade only. Courses taken on a P/NP or S/U grading basis can be repeated on the same basis or for a letter grade. There are limitations on the number of repeated units that count toward a degree.

**Residence** This word is used in a number of senses in this catalog; care must be taken to determine the meaning of the word each time it is used: (1) to denote registration in a regular session (i.e., when a student is in "residence" during fall, winter, or spring quarters); (2) to denote the period of time that a student must be registered at UCD in order to be eligible for graduation (i.e., academic residence); (3) to denote a student's state of residence (e.g., California) to determine if non-resident tuition must be paid (i.e., legal residence); (4) to indicate the student's place of residence (i.e., living quarters).

**Sabbatical** A leave of absence granted to a University professor for travel, research, etc. May be from one quarter to a full year.

**Satisfactory/Unsatisfactory** The equivalent of Passed/Not Passed for graduate students. The "S" grade is given for a grade of B- or better in graduate courses and C- or better in undergraduate courses.

**Semester** A subdivision of the academic year into two sessions, usually fall and spring, each lasting approximately 18 weeks. Only the School of Law uses the semester system at UCD. To convert semester units to quarter units, multiply by 3/2.

**Study List** The official program of courses for which a student registers. Your course enrollment form is submitted to the Registrar at the time of registration each quarter. In the College of Agricultural and Environmental Sciences, the Study List also refers to a student's long-term academic study plan.

**Subject A** The University's requirement in English composition which must be completed to receive the bachelor's degree.

**Summer sessions** Two 6-week summer sessions are offered between the close of spring quarter and the opening of fall quarter. Regular instruction, both undergraduate and graduate, is offered for full credit.

**TA (Teaching Assistant)** TA's are graduate students, usually on the doctoral level, who teach on a part-time basis while pursuing their degrees. They are selected, trained, and supervised by senior faculty members in each department.

**TB** Stands for "temporary building," usually a trailer or pre-fabricated building not intended as a permanent facility.

**TBA** Stands for "to be announced." In the Class Schedule and Room Directory course listings, TBA may refer to class meeting time, instructor's name, or room number for class meeting.

**Tenure** Denotes security of employment until retirement; may be granted to a faculty member after a specified number of years at the University.

**Term** A regular quarter (fall, winter, or spring) or semester (fall or spring).

**Transcript** An official copy of your academic record (grades) at an educational institution such as the University of California.

**Undergraduate** A college student who is pursuing a bachelor's degree.

**Unit** Courses are assigned a unit value based on one unit of credit for every three hours of work (in-class and preparation time) per week by the student. A student's progress in the University and class level are determined in part by the number of units completed.

**Upper Division** Junior and senior standing at UCD, based upon completion of at least 84.0 units; also refers to UCD courses numbered 100-199.

**Work-Learn** An internship program providing on-the-job experience in a student's field of interest. Participation may be full time (during the summer or academic year) or part time, and may be paid or volunteer. Academic credit may also be earned.

**Work-Study** A financial aid program which provides eligible students with part-time jobs on campus or with off-campus nonprofit organizations.

# STATEMENT ON LEGAL RESIDENCE AT THE UNIVERSITY OF CALIFORNIA

Each new student entering the University of California (and each former student returning after an absence of one or more quarters) is required to submit a Statement of Legal Residence to the Office of the Registrar. This Statement is used by the Residence Deputy in determining the residence of each student for fee assessment purposes.

Students who have not been residents of California for more than one year immediately prior to the residence determination date for each quarter in which they propose to attend the University are charged, along with other fees, a nonresident tuition fee.

The residence determination date is the day instruction begins at the last of the University of California campuses to open for the quarter, and for schools on the semester system, the day instruction begins for the semester.

## Establishing Legal Residence for Tuition Purposes

In order to be classified as a resident for tuition purposes upon admission to the University of California, an adult student, other than an adult alien present in the United States under the terms of a nonimmigrant status which precludes the alien from establishing domicile in the U.S., must be able to provide evidence of having established his or her residence in California at least one year immediately preceding the residence determination date for the term during which he or she proposes to attend the University and must have relinquished any prior residence. An adult student must couple his or her physical presence within this State for one year with objective evidence that such presence is consistent with his or her intent in making California his or her permanent home. If these steps are delayed, the one-year durational period will be extended until BOTH presence and intent have been demonstrated for one full year. Physical presence within the state solely for educational purposes does not constitute the establishment of California residence under State law regardless of the length of the student's stay in California.

Relevant indicia which can be relied upon to demonstrate one's intent to make California the permanent residence include, but are not limited to, the following: registering and voting in California elections; designating California as the permanent address on all school and employment records, including military records if one is in the military service; obtaining a California driver's license or California Identification Card, if a non-driver; obtaining California vehicle registration; paying California income taxes as a resident, including taxes on income earned outside this state from the date residence is established; establishing an abode where one's permanent belongings are kept within California; licensing for professional practice in California; residing in California during summers and holidays; maintaining active checking or savings accounts in California banks; and the absence of these indicia in other places during any period for which residence in California is asserted. Documentary evidence may be required. No single factor is controlling or decisive. All relevant indicia will be considered in the classification determination.

The residence of the parent with whom an unmarried minor (under age 18) child lives is the residence of the unmarried minor child. When the minor lives with neither parent his or her residence is that of the parent with whom he or she last lived. A minor, except a minor alien who is precluded by the Immigration and Naturalization Act from establishing domicile in the U.S., may establish his or her residence when both parents are deceased and a legal guardian has not been appointed. The residence of an unmarried minor who has a parent living cannot be changed by his or her own act, by the appointment of a legal guardian, or by relinquishment of a parent's right of control (see Exceptions below). Where the residence of the minor is derived, the California residence of

the parent from whom it is derived must satisfy the one-year durational requirement.

An adult establishes his or her own residence. Residence of an adult is not derived from a spouse or parents.

## Reclassification

A student seeking resident reclassification for tuition purposes must petition at the Office of the Registrar. Documentation of residence (driver's license, voter registration receipt, etc.) will be required at that time. Financial independence will be included among the factors considered for students classified nonresident seeking reclassification to resident for tuition purposes. Financial independence will not be considered for graduate students who are teaching assistants, research assistants or teaching associates employed on a 0.49 percent or more time basis for the term for which reclassification is sought. All changes of status must be initiated two weeks prior to the in-person registration period for the quarter or semester for which the student intends to be reclassified. No petitions will be accepted after instruction begins.

Detailed information concerning reclassification can be obtained by contacting the Residence Deputy at the Registrar's Office.

## Incorrect Classification

Those classified incorrectly as residents are subject to reclassification and to payment of all nonresident fees not paid. If incorrect classification results from false or concealed facts (by the student), the student also is subject to University discipline. Resident students who become nonresidents must immediately notify the Residence Deputy at the Registrar's Office.

## Inquiries and Appeals

Inquiries from prospective students regarding residence requirements for tuition purposes should be directed to the Residence Deputy at the Office of the Registrar. No other University personnel are authorized to supply information relative to residence requirements for tuition purposes. Any student, following a final decision on residence classification by the Residence Deputy, may make written appeal to the Legal Analyst—Residence Matters, 590 University Hall, Berkeley, California 94720, —within 90 days after notification of the final decision by the Residence Deputy.

The student is cautioned that this summation is not a complete explanation of the law regarding residence. The student should also note that the rate of nonresident tuition and the residence requirements are subject to change. Regulations have been adopted by The Regents, a copy of which is available for inspection in the Registrar's Office of the campus.

## Exceptions

1. A minor who is a U.S. citizen or eligible alien and who remains in this state after his or her parent, who was a resident of California for at least one year immediately prior to leaving but has established residence elsewhere shall be entitled to retain resident classification if the student enters the University within one year after the parent moves, so long as continuous attendance is maintained at the University.
2. A student who is a U.S. citizen or eligible alien and who is a minor or 18 years of age may be eligible for resident status if he or she can show that he or she has been totally self-supporting through employment and actually present within California for the entire year immediately prior to the residence determination date and has demonstrated the intent to make California his or her permanent home.
3. A student who is a U.S. citizen or eligible alien shall be entitled to resident classification if immediately prior to the residence determination date he or she has lived with and been under the continuous direct care and control of any

adult or adults other than a parent for not less than two years. The adult or adults having such control must have been a California resident during the year immediately prior to the residence determination date. This exception continues until the student has attained the age of majority and has resided in the state the minimum time necessary to become a resident student, so long as continuous attendance is maintained at an institution.

4. A student who has not been an adult resident of California for more than one year and who is the dependent child of a California resident who has been a resident for more than one year immediately prior to the residence determination date may be entitled to resident classification until he or she has resided in California for the minimum time necessary to become a resident, so long as continuous attendance is maintained at an institution.

5. Exemption from payment of the nonresident tuition fee is available to the natural or adopted child, stepchild or spouse who is a dependent of a member of the United States military stationed in California on active duty. Such exemption may be maintained until the student has resided in California the minimum time necessary to become a resident. If a student is enrolled in an institution and (1) the member of the military is transferred on military orders to a place outside this state where he continues to serve in the armed forces or (2) the member of the military retires from active duty immediately after having been on active duty in California, the student is entitled to continue receiving the exemption so long as continuous attendance is maintained.

6. A student who is a member of the United States military stationed in California on active duty, except a member of the military assigned for educational purposes to a state-supported institution of higher education, shall be entitled to resident classification until he or she has resided in the state the minimum time necessary to become a resident.

7. Children of deceased public law enforcement or fire suppression employees, who were California residents and who were killed in the course of law enforcement or fire suppression duties, may be entitled to resident status.

8. The dependent children and spouses of full-time University of California employees whose permanent assignment is outside California may be entitled to resident classification.

#### **Waivers Of Nonresident Tuition**

To the extent funds are available, nonresident tuition waivers may be granted to a spouse and unmarried dependent children under age 21 of a University faculty member who is a member of the Academic Senate. Inquiries regarding this waiver should be directed to the Residence Deputy.

In addition, certain student Teaching Assistants and Teaching Fellows, and certain graduate students designated as University Fellows and Distinguished Scholars may be eligible for nonresident tuition waivers or fellowships. Such students should contact the Graduate Division at their campus for further information.

#### **UNIVERSITY POLICY ON NONDISCRIMINATION, SEXUAL HARASSMENT, STUDENT RECORDS, AND PRIVACY**

**Nondiscrimination.** The University of California, in compliance with Titles VI and VII of the Civil Rights Act of 1964, Title IX of the Education Amendments of 1972, and Sections 503 and 504 of the Rehabilitation Act of 1973, the Age Discrimination in Employment Act of 1967, and the Age Discrimination Act of 1975, does not discriminate on the basis of race, color, national origin, religion, sex, handicap, or age in any of its policies, procedures, or practices; nor does the University, in compliance with Section 402 of the Vietnam Era Veterans Readjustment Act of 1974, and Section 12940 of the State of California Government Code, discriminate against any employees or applicants for employment because they are

disabled veterans or veterans of the Vietnam era, or because of their medical condition (cancer-related) as defined in Section 12926 of the California Government Code, their ancestry, or their marital status; nor does the University discriminate on the basis of citizenship, within the limits imposed by law or University policy; nor does the University discriminate on the basis of sexual orientation. This nondiscrimination policy covers admission, access, and treatment in University programs and activities, and application for and treatment in University employment.

In conformance with University policy and pursuant to Executive Orders 11246 and 11375, Section 503 of the Rehabilitation Act of 1973, and Section 402 of the Vietnam Era Veterans Readjustment Act of 1974, the University of California is an affirmative action/equal opportunity employer.

Inquiries regarding the University's equal opportunity policies may be directed to the Vice Chancellor of Academic Affairs and Affirmative Action Officer, 525 Mrak Hall, 916-752-2070. Speech and hearing impaired persons may dial (TDD) 916-752-7320.

**Sexual Harassment.** Sexual harassment of students, staff, or faculty members is prohibited by law and by University regulation. Sexual harassment is unacceptable and will not be condoned on the UCD campus. The campus community will take all necessary and appropriate steps to protect students, staff, and faculty from sexual harassment and all forms of sexual intimidation and exploitation. Grievance procedures for student complaints charging legally impermissible discrimination (Policy 280-05) are available in the Office of Student Activities and Conduct and may be used to bring complaints of sexual harassment. Students may receive informal counseling and formal assistance by contacting any of the following offices: Vice Chancellors, Deans of the Schools and Colleges, or the Office of Student Activities and Conduct. In addition, the ASUCD Student Grievance Center, Counseling Center, and the Women's Resources and Research Center are available to provide referral service.

**Disclosures from Student Records.** In accordance with the Federal Family Educational Rights and Privacy Act of 1974 and campus procedures implementing the University of California Policies Applying to the Disclosure of Information from Student Records, students at the Davis campus of the University have the right:

- To inspect and review records pertaining to themselves in their capacity as students;
- To have withheld from disclosure, absent their prior consent for release, personally identifiable information from their student records, with exceptions as noted in Section 10.70 of the University's policies;
- To inspect records maintained by the campus of disclosure of personally identifiable information from their student records;
- To seek correction of their student records through a request to amend the records or a request for a hearing; and
- To file complaints with the Department of Education regarding alleged violations of the rights accorded them by the Federal Act.

These rights are implemented on the Davis campus by UCD Policy and Procedure Manual, Section 320-21, "Disclosure of Information from Student Records."

Questions about these rights should be referred to Jeanne Wilson, Office of Student Judicial Affairs, telephone 916-752-1128. Copies of the Federal Act, the full text of the UC Policies and the UCD Policy and Procedure Manual, Section 320-21, may be consulted at the Reference Desk of the Shields Library. Copies of the UC policies may be obtained at the Office of Student Judicial Affairs.

Categories of personally identifiable information designated by the campus as public information are: name, address (campus and/or permanent), telephone numbers, date and place of birth, major field of study, dates of attendance, degrees and honors received, the most recent previous educational institution attended, participation in officially recognized activities, including intercollegiate athletics and the name, weight, and height of the participants on intercollegiate University athletic teams provided, however, that address and telephone numbers are not public information with respect to interns, residents and fellows and that with respect to these students, public information also includes primary hospital assignment, field of residency training, and name of medical school awarding the M.D. degree.

Students who desire to withhold their addresses and telephone listings may so indicate by the last day of registration on the Student Data Card included with the registration materials. Students who desire to withhold their entire record must file a form available at the Registrar's Office.

Students availing themselves of this right should understand what the consequences of this action may be. For example, the campus cannot make public any honors received by the student, e.g., the award of a Regents Scholarship or election to Phi Beta Kappa, and cannot include the student's name and degree earned in the campus commencement program without the written consent of the student. Similarly, if a request is made to withhold from disclosure a student's name and dates of attendance, a student's status as a student cannot be verified for potential employers without written consent of the student. Furthermore, if a student's last instruction to the campus was to withhold from disclosure the degree granted to that student and the date on which the degree was conferred, that information cannot be confirmed for a third party in connection with the appointment of that graduate to a new position or published in connection with an honor that individual subsequently receives. Students may reverse the decision of a previous quarter at any time.

**Privacy Act.** A student's Social Security number is used to verify personal identity in the UCD Student Records System. In accordance with the Federal Privacy Act of 1974, students are hereby notified that disclosure of their social security number is mandatory. This recordkeeping system was established prior to January 1, 1975 pursuant to the authority of The Regents of the University of California under Art. IX, Sec. 9, of the California Constitution.

**PROPORTION OF UC DAVIS GRADUATES FINDING WORK IN THEIR FIELDS OF CHOICE<sup>1</sup>**

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 13 percent of graduates who had not decided on a career field at the time of the survey.

Field of Study <sup>2</sup>												
Animal Science	Applied Economics	Behavioral Science	Food Science	Plant Science	Bio-science (Percentage finding work in field of choice)	Resource Science	Engineering	Humanities	Physical Science	Social Science	Total Percent	
61	77	88	90	100	74	69	97	61	80	70	78	

<sup>1</sup>Source: A 1988 survey of June 1987 graduates conducted by Student Affairs Research and Information, UC Davis.

<sup>2</sup>Fields of Study are groups of related undergraduate majors; for example, "Animal Science" would include such majors at UC Davis as Animal Science, Avian Sciences, and Wildlife and Fisheries Biology.

**RETENTION DATA<sup>1</sup> AND GRADUATION RATES AT UC DAVIS****Freshmen**

(Retention and graduation rates through Spring 1989 for regularly admissible undergraduates entering UC Davis as freshmen.)

Fall Quarter of Initial Enrollment:	Number of Students	Percent Enrolled 4 Quarters	*Percent Graduating in	
			12 Quarters	15 Quarters
1979	2,556	88%	35%	65%
1980	2,866	89%	36%	67%
1981	2,610	90%	34%	69%
1982	2,350	91%	38%	71%
1983	2,281	92%	32%	71%
1984	2,780	93%	29%	66%

**Transfer Students**

(Retention and graduation rates through Spring 1989 for undergraduates transferring to UC Davis as juniors.)

Fall Quarter of Initial Enrollment:	Number of Students	Percent Enrolled 4 Quarters	Percent Graduating in	
			6 Quarters	9 Quarters
1981	551	87%	41%	75%
1982	633	86%	39%	70%
1983	616	89%	36%	75%
1984	704	89%	35%	72%
1985	629	90%	35%	71%
1986	599	91%	32%	67%

\*These are not necessarily quarters of continuous enrollment. Students may drop out or go on Planned Educational Leave for a quarter or longer, and then resume their studies. (There are three quarters in each academic year.)

<sup>1</sup>Source: Student Affairs Research and Information, UC Davis (January 1990).

**AVERAGE MONTHLY SALARY OFFERED TO GRADUATES WITH BACHELOR'S, MASTER'S, AND DOCTORATE DEGREES<sup>1</sup>**

Field of Study:	Average Monthly Salary		
	Bachelor's	Master's	Doctorate
Engineering	\$2,200-2,891	\$2,616-3,225	\$4,175-4,602
Humanities/Social Sciences	1,922-2,346	1,871-2,481	—
Allied Health/Life Sciences	1,960-2,450	2,012-2,977	2,539-3,817
Physical Sciences	2,015-2,658	2,780-3,570	3,317-3,854

<sup>1</sup>Source: College Placement Council Salary Survey (January 1990).

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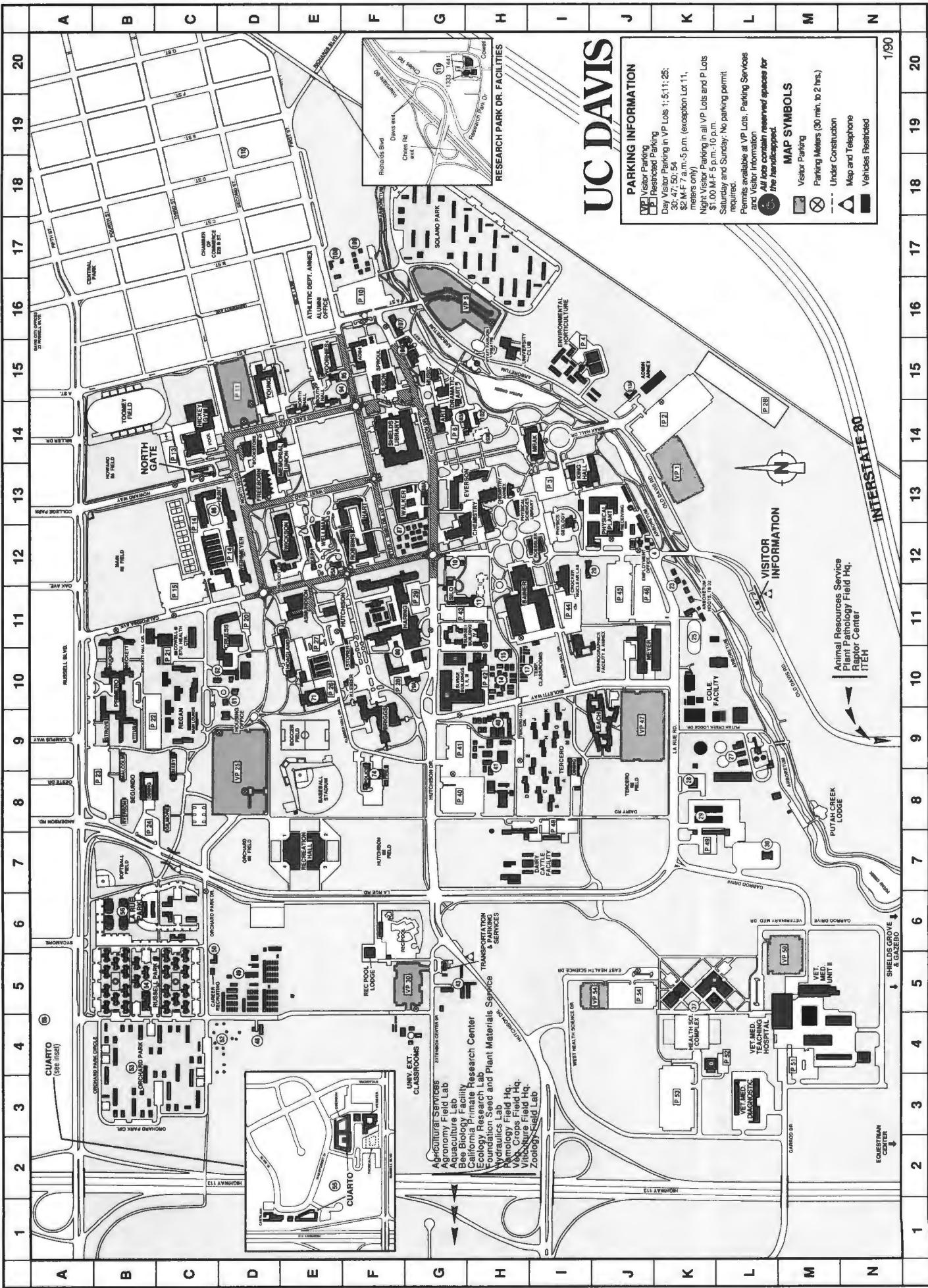
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(\*Refer to Outlying Areas Map)

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## About the Cover

Founded in 1908, the library began as a small collection of agricultural bulletins in a room in the old creamery building on the southwest corner of East Quad and Peter J. Shields Avenue. The picture (opposite, top) shows the building in about 1910. By 1924 the library contained two thousand volumes housed in two classrooms. It wasn't until the completion of a new library and administration building in 1940 that the collection, numbering some fifty thousand volumes, was properly housed for the first time.



The color photos on the cover show the Shields Library expansion, completed in early 1990. The addition to the library of more than 121,000 square feet will allow the space shown in the black and white photo on the front cover to be restored to its original use as a reading room. The large room with lofty windows was on the second floor of the 1940 library (all of the campus administration occupied the first floor of this the original north wing) and also contained the reference collection. The periodicals section took over this room in 1967 when the completion of a Shields Library addition provided space for a reference department and reading room on the first floor.

The reference department has changed more than just its location since 1940. Computers have become an important addition to a modern library. Students can use compact disk databases and CD-ROM readers (middle photo) to quickly find references to periodical articles in a number of fields. Since 1983 the MELVYL online catalog has provided computer access to the collection. This access was once only available by using the card catalog (bottom). MELVYL terminals are located throughout the library.



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### SOFTWARE:

Quark XPress, 2.12 (page layout and typographic formatting); Microsoft Word, 4.0 (word processing); AppleShare 2.0.1, CE Software's Quick-Mail 2.0, and Beagle Bro's Flash 1.0 (file sharing); Dataviz's MacLink Plus/DaynaFile 4.0 (file translation); Fifth Generation's Suitcase II (font handling); Aldus PageMaker 3.02 with Color Extension (layout for outside front and back cover); and Adobe Helvetica type family.

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Second Class

