

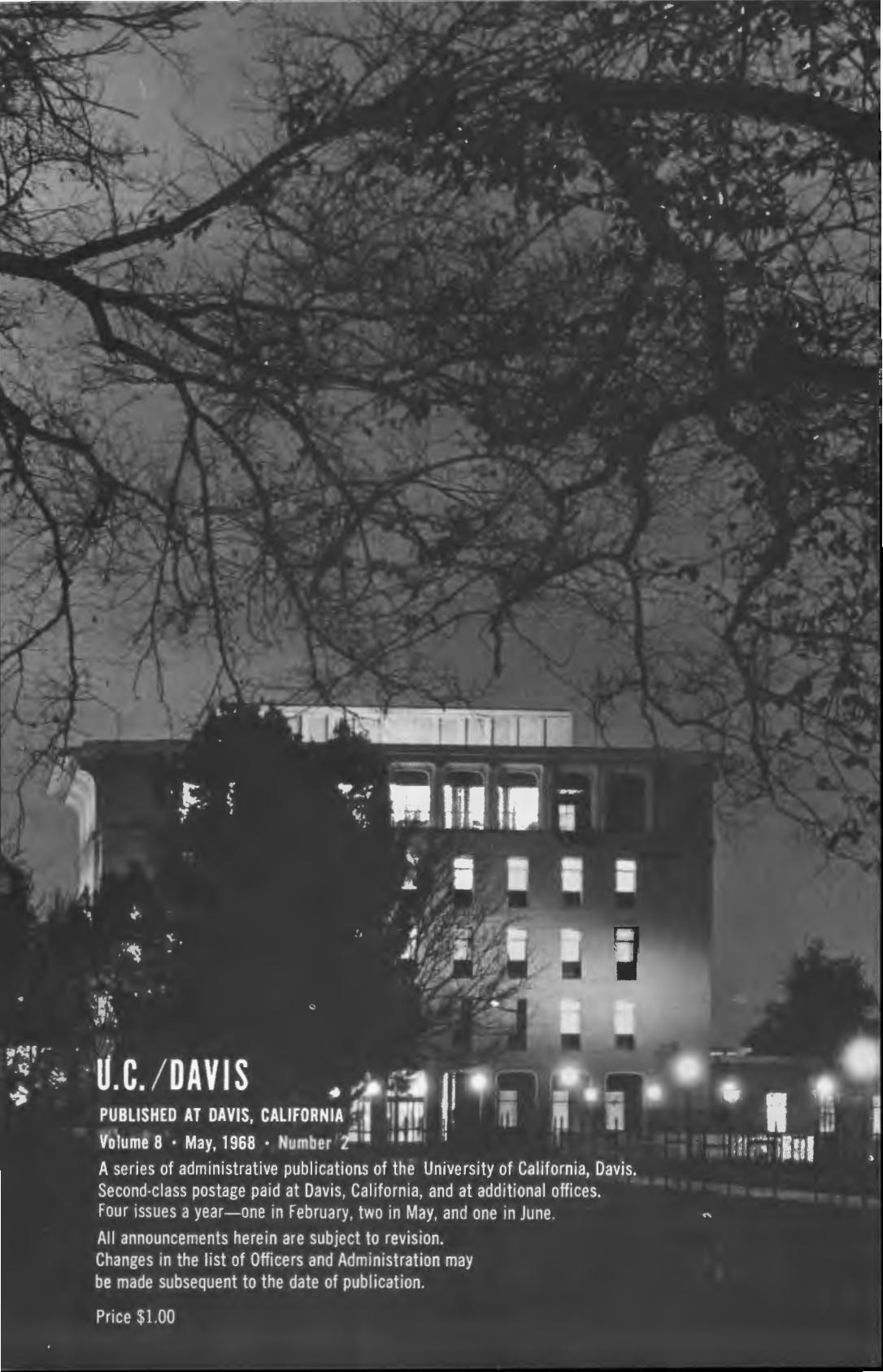
UNIVERSITY
OF
CALIFORNIA
—
GENERAL
CATALOG

1968-69

DAVIS



U. C. DAVIS
GENERAL CATALOG
1968-69
UNIVERSITY OF CALIFORNIA, DAVIS



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GENERAL CATALOG

Davis

Fall, Winter, and Spring Quarters
1968-1969



May, 1968

UNIVERSITY OF CALIFORNIA • DAVIS

Contents

GENERAL	1
Calendar, 5. The Regents of the University of California, 10. Administrative Officers of the University, 10. General Administrative Officers—Davis Campus, 11. Davis Campus, 13. The Honor Spirit, 15. University Library, 15. Education Abroad, 16. Summer Sessions, 16. University Extension, 17. Foreign Language Training, 17. The Statewide University, 17.	
ADMISSION AND REGISTRATION	2
Admission to Freshman Standing, 19. Admission to Advanced Undergraduate Standing, 22. Admission of Applicants from Other Countries, 23. Requirements for Admission to Graduate Standing, 24. Special Admission Categories, 24. Application Procedures, 25. General Registration Procedure, 27. Adding or Dropping Courses, 28. Changes of Major, College or School, 29. Change of Name, 28. Withdrawals, 28. Readmission After an Absence, 28. Rules Governing Residence, 29.	
SCHOLASTIC REQUIREMENTS	3
Evaluations, 31. Scholastic Deficiencies, 31. Transcripts of Record, 32. Mid-Term Warning Notices, 33. Final Examinations, 33. Graduation Requirements, 33. Honors and Prizes, 36.	
STUDENT EXPENSES, HOUSING, AND FINANCIAL AIDS	4
Financial Aids Program, 37. Expenses, 37. Application Procedure, 38. Scholarships, 39. Educational Opportunity Grants, 40. College Work Study Program, 40. Loans, 40. Miscellaneous, 42. Living Accommodations, 43.	
STUDENT SERVICES AND ACTIVITIES	5
Student Health Program, 45. Placement Services, 46. Counseling Center, 47. Selective Service, 47. Military Science, 48. International Student Services, 48. Student Conduct and Discipline, 48. The Associated Students and Student Activities, 49.	
REQUIREMENTS AND CURRICULA	6
College of Agricultural and Environmental Sciences, 53	School of Law, 117
College of Engineering, 87	School of Medicine, 121
College of Letters and Science, 101	School of Veterinary Medicine, 127
	Graduate Division, 133
INDEX OF COURSE OFFERINGS	7
COURSES OF INSTRUCTION	8
Explanatory Note, 143. Symbols, 144.	
INDEX	9



UNIVERSITY CALENDAR

1968-1969

Davis Campus

Fall Quarter 1968

March 1, Friday	Applications for admission to undergraduate standing, including applications for intercampus transfer, for the fall quarter 1968 must be filed with complete credentials with the Office of Admissions on or before this date.
*May 6, Monday May 14, Tuesday	{ Pick up registration and course enrollment materials for fall quarter 1968 from the Registrar's Office (continuing students only).
*May 9, Thursday May 14, Tuesday	{ All continuing students except those enrolled in College of Letters and Science, and Law and Veterinary Medicine Schools obtain adviser's approval of preferred program for fall quarter 1968.
May 15, Wednesday August 16, Friday	{ Turn in registration and course enrollment materials along with fee payments for fall quarter 1968 (continuing students only). Course enrollment requests may be returned separately and before registration forms and fee payments. Course enrollment requests will be given priority in the order in which they are received and fees must be paid in order to validate class assignments.
June 15, Saturday	Credentials and applications for admission to graduate standing for fall quarter 1968 must be filed with the Dean of the Graduate Division on or before this date.
June 28, Friday	Candidates who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in December 1968 must file applications for candidacy with the Dean of the Graduate Division on or before this date.
August 30, Friday	Applications for readmission to graduate status for fall quarter 1968 must be filed with the Registrar on or before this date.
September 2, Monday	Applications for readmission to undergraduate status for fall quarter 1968 must be filed with the Registrar on or before this date.
September 23, Monday September 23, Monday September 28, Saturday September 26, Thursday September 27, Friday September 27, Friday	{ Fall quarter begins. Orientation and testing. Registration in person. Thesis for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in December 1968 must be filed with the committees in charge on or before this date.
September 30, Monday September 30, Monday October 8, Tuesday October 4, Friday	Instruction begins. { File study lists by mail (continuing students only). Candidates who expect to complete work for masters' degrees to be conferred in December 1968 must file applications for candidacy on or before this date.
October 9, Wednesday October 11, Friday October 11, Friday	{ File study lists in person. Petitions to enroll or add courses to study lists must be filed on or before this date. Last day to register. Candidates who expect to complete work for A.B. and B.S. degrees to be conferred in December 1968 must file an announcement of candidacy with the Registrar on or before this date.

* Weekends and holidays excepted.

October 18, Friday	Petitions to drop courses without scholarship penalty must be filed with the Registrar on or before this date.
November 1, Friday	Candidates who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in March 1969 must file applications for candidacy with the Dean of the Graduate Division on or before this date.
*November 4, Monday November 12, Tuesday	Applications for admission to undergraduate standing, including applications for intercampus transfer, for the winter quarter 1969 must be filed with complete credentials with the Office of Admissions on or before this date.
*November 7, Thursday November 12, Tuesday	<p>Pick up registration and course enrollment materials for winter quarter 1969 from the Registrar's Office (continuing students only).</p> <p>All continuing students except those enrolled in College of Letters and Science, and Law and Veterinary Medicine Schools obtain adviser's approval of preferred program for winter quarter 1969.</p>
November 9, Saturday *November 13, Wednesday November 15, Friday	Homecoming Day. Turn in registration and course enrollment materials along with fee payments for winter quarter 1969 (continuing students only). Course enrollment requests may be returned separately and before registration forms and fee payments. Course enrollment requests will be given priority in the order in which they are received and fees must be paid in order to validate class assignments.
November 15, Friday	Credentials and applications for admission to graduate standing for winter quarter 1969 must be filed with the Dean of the Graduate Division on or before this date.
November 25, Monday	Theses for masters' degrees to be conferred in December 1968 must be filed with the committees in charge on or before this date.
November 28, Thursday November 29, Friday December 6, Friday	Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in December 1968 must be filed with the Dean of the Graduate Division on or before this date.
December 7, Saturday December 9, Monday December 14, Saturday December 12, Thursday	<p>Thanksgiving holiday—academic and administrative holiday.</p> <p>Applications for readmission to graduate status for winter quarter 1969 must be filed with the Registrar on or before this date.</p> <p>Instruction ends.</p>
December 13, Friday	Final examinations.
December 14, Saturday December 23, Monday December 25, Wednesday December 31, Tuesday	<p>Applications for readmission to undergraduate status for winter quarter 1969 must be filed with the Registrar on or before this date.</p> <p>Theses for masters' degrees to be conferred in December 1968 must be filed with the Dean of the Graduate Division on or before this date.</p> <p>Fall quarter ends.</p>
January 1, Wednesday	<p>Christmas holiday—academic and administrative.</p> <p>Applications for admission to the School of Medicine for 1969-70 must be filed with the School before this date.</p> <p>New Year's holiday—academic and administrative.</p> <p>Applications for admission to undergraduate standing including applications for intercampus transfer, for the spring quarter 1969 must be filed with complete credentials with the Office of Admissions on or before this date.</p>

* Dates are subject to change and should be checked with appropriate *Schedule and Directory*.

Winter Quarter 1969

January 2, Thursday	Winter quarter begins. Registration in person.
January 2, Thursday	{ Orientation and testing.
January 3, Friday	Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in March 1969 must be filed with the committees in charge on or before this date.
January 3, Friday	Instruction begins.
January 6, Monday	{ File study lists by mail (continuing students only).
January 6, Monday	Candidates who expect to complete work for masters' degrees to be conferred in March 1969 must file applications for candidacy on or before this date.
January 14, Tuesday	{ File study lists in person.
January 10, Friday	Petitions to enroll or add courses to study lists must be filed on or before this date.
January 15, Wednesday	Last day to register.
January 17, Friday	Candidates who expect to complete work for A.B. and B.S. degrees to be conferred in March 1969 must file an announcement of candidacy with the Registrar on or before this date.
January 17, Friday	Petitions to drop courses without scholarship penalty must be filed with the Registrar on or before this date.
January 24, Friday	Candidates who expect to complete work for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June 1969 must file applications for candidacy with the Dean of the Graduate Division on or before this date.
February 1, Saturday	Applications for fellowships and graduate scholarships for 1969-70 must be filed on or before this date.
*February 3, Monday	Applications for 1969-70 undergraduate scholarships for current students must be filed on or before this date.
February 13, Thursday	{ Pick up registration and course enrollment materials from the Registrar's Office for spring quarter 1969 (continuing students only).
*February 6, Thursday	{ All continuing students except those enrolled in College of Letters and Science, and Law and Veterinary Medicine Schools obtain adviser's approval of preferred program for spring quarter 1969.
February 13, Thursday	Lincoln's birthday—academic and administrative holiday.
February 12, Wednesday	Applications for 1969-70 undergraduate scholarships for new students must be filed on or before this date.
February 15, Saturday	Credentials and applications for admission to graduate standing for spring quarter 1969 must be filed with the Dean of the Graduate Division on or before this date.
*February 17, Monday	{ Turn in registration and course enrollment materials along with fee payments for spring quarter 1969 (continuing students only). Course enrollment requests may be returned separately and before registration forms and fee payments. Course enrollment requests will be given priority in the order in which they are received and fees must be paid in order to validate class assignments.
February 18, Tuesday	Theses for masters' degrees to be conferred in March 1969 must be filed with the committees in charge on or before this date.
February 21, Friday	Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in March 1969 must be filed with the Dean of the Graduate Division on or before this date.
February 28, Friday	Applications for admission to the School of Veterinary Medicine for 1969-70 must be filed with the Office of Admissions on or before this date.

* Dates are subject to change and should be checked with appropriate *Schedule and Directory*.

March 1, Saturday	Applications for admission to undergraduate standing, including applications for intercampus transfer, for the fall quarter 1969 must be filed with complete credentials with the Office of Admissions on or before this date.
March 7, Friday	Applications for readmission to undergraduate status for spring quarter 1969 must be filed with the Registrar on or before this date.
March 10, Monday	Applications for readmission to undergraduate status for spring quarter 1969 must be filed with the Registrar on or before this date.
March 15, Saturday	Instruction ends.
March 17, Monday	{ Final examinations.
March 22, Saturday	Theses for masters' degrees to be conferred in March 1969 must be filed with the Dean of the Graduate Division on or before this date.
March 21, Friday	Winter quarter ends.
March 22, Saturday	Spring holiday—academic and administrative.
March 28, Friday	Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June 1969 must be filed with the committees in charge on or before this date.

Spring Quarter 1969

March 31, Monday	Spring quarter begins. Registration in person.
March 31, Monday	{ Orientation and testing.
April 1, Tuesday	Instruction begins.
April 2, Wednesday	{ File study lists by mail (continuing students only).
April 3, Thursday	Candidates who expect to complete work for masters' degrees to be conferred in June 1969 must file applications for candidacy with the Graduate Division on or before this date.
April 11, Friday	{ File study lists in person.
April 4, Friday	Petitions to enroll or add courses to study lists must be filed on or before this date.
April 14, Monday	Last day to register.
April 16, Wednesday	Candidates who expect to complete work for A.B. and B.S. degrees to be conferred in June 1969 must file announcement of candidacy with the Registrar on or before this date.
April 16, Wednesday	Picnic Day—academic and administrative holiday.
April 19, Saturday	Petitions to drop courses without scholarship penalty must be filed with the Registrar on or before this date.
April 23, Wednesday	Applications for admission to the School of Law for 1969-70 must be filed with the School on or before this date.
May 1, Thursday	Theses for masters' degrees to be conferred in June 1969 must be filed with the committees in charge on or before this date.
May 16, Friday	Theses for the degrees of Doctor of Philosophy and Doctor of Engineering to be conferred in June 1969 must be filed with the Dean of the Graduate Division on or before this date.
May 23, Friday	Memorial Day—academic and administrative holiday.
May 30, Friday	Instruction ends.
June 7, Saturday	{ Final examinations.
June 9, Monday	Theses for masters' degrees to be conferred in June 1969 must be filed with the Dean of the Graduate Division on or before this date.
June 14, Saturday	Spring quarter ends.
June 13, Friday	Commencement.
June 14, Saturday	
June 15, Sunday	

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1

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1

...the campus will preserve the tone of its nonurban traditions; the spirit of service, and of involvement and integration of all its units with every other unit. Its students and its faculties will strive to maintain its traditional atmosphere of closeness and friendliness.

—UCD Long-Range Development Plan

Davis Campus

The University of California is a publicly supported institution of higher learning, dedicated to the tasks of increasing and disseminating human knowledge through the primary functions of teaching and research. As an institution, the University is committed to the achievement of academic excellence. To fulfill this commitment it is essential that all members of the University community qualify for their roles by superior preparation, intellectual curiosity, freedom from prejudice, and a desire to contribute significantly to the cultural advancement of humanity.

A spirit of service and an atmosphere of closeness and friendliness accompany the commitment to academic excellence on the Davis campus. They grew naturally from the first days of regular instruction in 1909, when the student body consisted of twenty-eight young men who wanted to become efficient farmers.

Originally known as the University Farm, the campus was acquired to serve the rural population of California, offering three years of instruction in the principles and practice of managing soils, crops, and animals. The need for such training had been anticipated by the late Judge Peter J. Shields, who helped write the legislative Act of 1905 establishing the Farm, and who is known as "the Father of the Davis Campus."

The need for greater educational opportunities in the state increased rapidly, and in 1922, in conjunction with the Berkeley College of Agriculture, the degree of Bachelor of Science in Agriculture was granted. A few years later the Davis campus had its own College of Agriculture. In 1946 the School of Veterinary Medicine was established. Meanwhile, from an institution which had offered only a few basic, practical courses emphasizing agriculture, a full-fledged University campus was beginning to emerge.

The period of most rapid change and expansion began in 1951 when the College of Letters and Science was founded, and more degree programs became available. Although Davis had long offered courses in the humanities and social sciences, the faculty in these disciplines now joined with the natural sciences faculty to offer fully developed University curricula. By 1961 graduate programs were so extensive and so numerous that a Graduate Division was established as a separate academic unit. The College of Engineering was formed in the following year, owing much to the foundation already provided by the curriculum in agricultural engineering which had been offered on the campus for many years. The School of Law held its first classes in the fall of 1966, and the School of Medicine, will commence in the fall of 1968.

Adding to the breadth of the campus and strengthening its research capacities for serving the people of California are the National Center for Primate Biology,

the Radiobiology Laboratory, the Institute of Governmental Affairs, the Agricultural History Center, the International Agricultural Center, the Crocker Nuclear Laboratory, the Computer Center, the Arboretum and the Laboratory for Research in Fine Arts and Museology.

Although the face of the campus is constantly changing to accommodate the increasing student population, long-range building plans envision the preservation of features that give Davis its particular character. The Quadrangle, traditional focus of campus activity, will continue to be the center of academic life, with the Library to the south and the Memorial Union complex extending the length of its north side. The cork oaks surrounding the Quad are an enduring part of the landscape, as is the plane tree court, where Commencement exercises were once held. Today the court is enclosed by the expanding Library building, providing a spacious open-air retreat, easily accessible from the general reading rooms of the Library.

The Library completed another stage in its expansion last year increasing its book capacity and seating space. Between it and Olson Hall, in the southeast corner of the quad, is a new pedestrian walkway-bicycle pathway designed to handle the traffic and complement the Quadrangle landscaping. Behind the Library is the new Fine Arts Complex housing the Music, Art, and Dramatic Art departments. The construction of this complex adds a concert room with pipe organ and set-ups for electronic music, two small theater labs, and a large Main Theater to the campus cultural facilities. These, together with Wyatt-Pavilion Theater—an Elizabethan theater beside Putah Creek, and Freeborn Hall—an assembly hall in the Memorial Union complex, give the campus an opportunity to provide cultural leadership to the Sacramento Valley, a goal set forth for the campus in the Long-Range Development Plan.

In pursuit of this aim, concerts, lectures, plays, films, and art exhibits have long been provided on campus. A number of distinguished artists have been guests of the University, remaining in residence for a quarter or more as performers, lecturers, and consultants. The Department of Dramatic Art is now sponsoring the third season of the Professional Resident Theater, a program under which professional actors take part in campus productions and participate in acting and directing workshops. The Music Department frequently has guest composers and performers in residence and has become an internationally known center for *avant-garde* music. The Art Department, as well as the Music Department, adds well known artists to its distinguished faculty and it exhibits the work of its own and other artists in its new Art Building Gallery. The Memorial Union also sponsors exhibits and shows travelling art collections in its fourth floor main gallery, its second floor reading and music listening rooms, and its main floor exhibit space.

In the continued expansion of the campus, attention will be given to strengthening new colleges and schools, preserving the excellence of established ones, and providing for the changing needs of students and the state. Educational innovation, physical expansion, and the preservation of traditions will mark our future growth.

THE HONOR SPIRIT

A long-time tradition on the Davis campus, the Honor Spirit is most evident at examination time, when there are no proctors in the classrooms and students are relied on to do their own work.

But the Honor Spirit is not limited to student behavior during examinations. According to its code, the responsibility for good conduct rests with the individual student; this attitude pervades all student activities. It is largely responsible for the atmosphere of mutual respect and confidence that exists between students and faculty, as well as among the students themselves.

UNIVERSITY LIBRARY

The Library on the Davis campus contains about 650,000 volumes and annually receives 17,250 current periodicals and serials including government publications. Its holdings in the natural sciences and agriculture are outstanding, and collections in the humanities, social sciences, fine arts, engineering, law, and medicine are being rapidly developed. In addition to the main library, there are branch libraries for health sciences, physical sciences, and agricultural economics, a law library, and several specialized departmental collections.

To accommodate the rapidly growing collection and satisfy the need for additional reading space, a wing was added to the General Library in 1964, and a second wing, completed in 1967, doubles the space available for books and readers. Plans for development anticipate 900,000 volumes by 1970.

The Library is operated on the "open stack" principle, permitting direct access to volumes shelved there. The Reference Department provides orientation and assistance in using the collection. In addition to the main stack collection, there are a number of special collections, including a Bibliographic Center collection, over 355,000 items on various forms of microcopy, some 20,000 maps, more than 100,000 pamphlets, a number of speech and music phonorecords, about 205,000 items in the F. Hal Higgins Library of Agricultural Technology, and a rare book collection of 10,250 volumes.

The Government Documents Department provides service for readers requiring use of government publications. The Library is an official depository for United States government publications, for all publications of the State of California, for the Atomic Energy Commission, which has made available over 126,000 unclassified publications of great value to scientific research, and for the National Aeronautics and Space Administration unpublished research reports.

The Reserve Book Service makes available for short-term loan periods a collection of several thousand volumes that are heavily used because of assigned class reading.

The Periodicals Room houses over 4,000 currently received, unbound issues of periodicals in a closed stack area. They are available for use only in the Library. A coin-operated copying machine in the Periodicals stack area can supply facsimiles of articles for \$.05 per exposure.

The Department of Special Collections provides readers with assistance in the use of rare books, University Archives, and the Library of Agricultural Technology. Other special facilities include a browsing collection for recreational reading, audio-visual equipment, a typing room, an outdoor reading area, and a copying service that provides facsimiles of printed materials at a nominal cost.

The Library provides its users with a series of information leaflets explaining in more detail the various aspects of its services and resources.

EDUCATION ABROAD

The Education Abroad Program provides outstanding students the opportunity to participate in the life of a university overseas. Its study centers, administered by faculty members drawn from all campuses of the University, are located in France, Germany, Hong Kong, Ireland, Italy, Japan, Spain, Sweden, the United Kingdom, Lebanon, Israel, and Mexico.

Students from all campuses are eligible to participate in the program, which is administered by the Santa Barbara campus for the entire University. Requirements for qualification are: junior standing in the University, a B average (overall and in the language), seriousness of purpose, and an indication of ability to adapt to a new culture. A Faculty Selection Committee on each campus recommends students who meet these standards.

Participants spend nine to eleven months abroad, beginning the year with a special language orientation program of six or seven weeks. The time allowed provides for a full academic year in the university of their choice and some vacation travel. The Study Center at Mexico City operates for two quarters only and is planned for future teachers of Spanish in secondary and elementary schools. Students enrolled in the program receive full academic credit for courses satisfactorily completed. The estimated total cost, including a modest allowance for spending money and vacation travel, ranges from \$1,850 to \$2,600.

A free publication listing courses offered at the study centers is available at the International Students' office on this campus. Further information and application forms may be obtained from the Education Abroad Adviser at the Office of International Student Services, 109 North Hall.

SUMMER SESSIONS

In 1968 there will be two regular six-week Summer Sessions beginning on June 17 and on July 29. The Summer Sessions will offer a number of lower division, upper division, and graduate courses of interest to students who may wish to maintain or accelerate progress toward their degree objectives. A substantial offering of upper division and graduate courses of interest to teachers and teacher candidates will also be provided, including courses for teacher candidates who have been admitted to internship programs and for other qualified graduate students who may wish to complete requirements for teaching credentials or degrees. In addition, courses in the 198-199 and 298-299 series, advanced special study and research, will be available for qualified students in many departments.

Summer Sessions will also be conducted on the Los Angeles, Riverside, and Santa Barbara campuses. Information about these summer sessions is available in the Summer Sessions bulletins, obtainable from the Registrar, or from the Office of the Summer Sessions on the respective campuses.

Announcements concerning summer sessions in 1969 will be issued by the Registrar and the Office of Summer Sessions.

UNIVERSITY EXTENSION

By a variety of methods the University of California Extension makes the resources of the University available to individuals and organizations throughout the state. Its aims are the intellectual and cultural development of adults; the dissemination of new knowledge resulting from teaching and research within the University; continuing professional, scientific, and technical training; development of special educational programs for public and private organizations, and education in public affairs.

Detailed information is available at the Extension office on any campus of the University or at the following additional locations: 1100 South Grand Avenue, Los Angeles 90015, Tel: (213) 747-4321; 55 Laguna Street, San Francisco 94102, Tel: (415) 861-6833; 3620B West 182nd Street, Torrance 90504, Tel: (213) 323-4773.

FOREIGN LANGUAGE TRAINING

Research and field work overseas may be facilitated by oral proficiency training in any of twenty-eight languages taught at the Defense Language Institute at the Presidio of Monterey. This unique program is available on a limited basis to University graduate students and faculty. For additional information, the campus Language Training Adviser may be consulted. Application forms may be obtained from the Secretary, University of California Language Training Advisory Committee, University of California, Santa Cruz, California 95060.

THE STATEWIDE UNIVERSITY

The University of California had its beginnings in 1868, with the Governor's signing of the Organic Act passed by the State Legislature. The following year the University opened its doors on the Oakland campus of the College of California. Five years later the University moved to Berkeley, when the first buildings were completed.

Today the University has nine campuses to serve the State of California. Davis continues to be the center for agricultural teaching and research. The other campuses are Berkeley, Irvine, Los Angeles, Riverside, San Diego, San Francisco, Santa Barbara, and Santa Cruz. Each campus has its own distinct atmosphere and special features, but all share the same high standards and adhere to the same admission regulations.

Each campus is headed by a chancellor, and the principal University-wide officer is the president. The government of the University is entrusted to a corporation called The Regents of the University of California. There are

twenty-four Regents: sixteen are appointed by the Governor; the others, including the President of the University, serve *ex officio*. An Academic Senate governs the academic activities of the University; it is composed of the president, chancellors, vice-chancellors, vice-presidents, deans, directors, registrars, librarians, and all professors and instructors responsible for courses.

The Davis Division of the Academic Senate determines the conditions for certificates and degrees (subject to the approval of the Regents) and authorizes and supervises all courses of instruction in the academic and professional colleges and schools.



Admission and Registration

The admission requirements of the University of California are uniform on all its campuses and are based on two assumptions: first, that the best assurance of success in the University is shown by high quality of scholarship in previous work; and second, that the study of certain specified subjects will give the student good preparation for University work.

Admission to the University qualifies the student to attend the campus of his choice within the limits of curricular offerings and student capacity.

2

ADMISSION TO FRESHMAN STANDING

An applicant for admission to freshman standing must meet the requirements listed below. Special requirements for nonresident applicants will be found on page 21.

Graduation from High School

SUBJECT REQUIREMENTS

Courses offered in satisfaction of the following requirements must appear on a list certified by the high school principal as meeting the subject requirements and approved by the Director of Admissions of the University of California.

a. History, 1 unit

This consists of 1 unit of United States history, or $\frac{1}{2}$ unit of United States history and $\frac{1}{2}$ unit of civics or American government.

b. English, 3 units

These consist of six semesters of English composition, literature, or oral expression.

c. Mathematics, 2 units

These consist of 2 units of subjects such as elementary algebra, geometry, trigonometry, calculus, elementary functions, matrix algebra, probability, statistics, or courses combining these topics. Arithmetic and such nonacademic subjects as shop mathematics and business mathematics are excluded.

d. Laboratory Science, 1 unit

This consists of an eleventh- or twelfth-grade year course in one laboratory science. Both semesters must be in the same subject field.

e. Foreign Language, 2 units

These must be in one language. Any foreign language with a written literature is acceptable.

f. Advanced course, 1 (or 2) unit

This is to be chosen from the following:

Mathematics, a total of 1 unit of second-year algebra, solid geometry, trigonometry, or other certified advanced courses.

Foreign Language, either 1 additional unit in the same foreign language offered under *e* above or 2 units of another foreign language.

Science, 1 unit of either chemistry or physics in addition to the science offered under *d*.

Electives

Additional elective units to complete the minimum of 15 standard high school entrance units are also required.

Examination Requirement

As a requirement for admission, all freshman applicants (and advanced standing applicants who have earned less than twelve units of college credit subsequent to high school graduation) must submit scores from the following examinations of the College Entrance Examination Board:

1. The Scholastic Aptitude Test
2. Three Achievement Tests, which must include:
 - a. English composition
 - b. social science or foreign language
 - c. mathematics or science

Applicants whose scholarship average in the required high school subjects is 3.00 to 3.09 inclusive must achieve a minimum total score of 2500 on the examinations. The test results of all applicants will be used for the purposes of counseling, guidance, placement, and, when possible, in satisfaction of the Subject A requirement.

The tests should be taken after completion of the first half of the eleventh grade. The first repetition of a test will be accepted, but the verbal and mathematics scores on the Scholastic Aptitude Test must be from the same sitting.

For arrangements to take the tests, see below.

EXAMINATION ARRANGEMENTS

Applicants for the fall quarter are urged to take the required examinations as early as possible. Those taking the examination after the January date will delay the processing of their applications.

Arrangements to take the tests should be made with the Educational Testing Service, P.O. Box 1025, Berkeley, California 94701, or P.O. Box 592, Princeton, New Jersey 08540. The fees are to be paid to the Educational Testing Service. Scores will be regarded as official only if they are received by the Office of Admissions directly from the Educational Testing Service.

SCHOLARSHIP REQUIREMENTS

At least a B average is required in courses taken after the ninth year used to meet the subject requirements. Grades received in elective courses or in courses taken in the ninth year or earlier are not used in computing this average. Subject requirements are satisfied by courses in which a grade of C or higher has been earned. Grades are considered on a semester basis except from schools that give only year grades. Grades, including those earned in accelerated and advanced courses, are accepted as they appear on the transcript.

In determining the B average, a grade of A in one course will be used to balance a C in another, but an A may not be used to compensate for D, I, or F grades. Courses taken in the ninth year or earlier in which a grade of D or lower is received may be repeated to establish subject credit.

Courses taken after the ninth year in which a grade of D or F is received may be repeated to establish subject credit and to improve scholarship. Courses may be repeated in an amount not to exceed a total of 1 unit of the *a-f* pattern. Grades earned in such repetitions will not be counted higher than a C in determining scholarship average.

Admission by Examination

A high school graduate who has not satisfied the entrance requirements as a result of his high school record and who has not attempted college work subsequent to high school (except during summer session immediately following high school graduation) may qualify for admission if he achieves the prescribed minimum scores in the following tests taken after the first half of the eleventh grade:

College Entrance Examination Board Scholastic Aptitude Test and Three Achievement Tests:

1. English composition
2. One in either social science or foreign language
3. One in either mathematics or science

Arrangements to take the tests should be made with the Educational Testing Service, P. O. Box 1025, Berkeley, California 94701, or P. O. Box 592, Princeton, New Jersey 08540. The fees are to be paid to the Educational Testing Service. Scores will be regarded as official only if they are received by the Office of Admissions directly from the Educational Testing Service. Applicants should arrange to take the tests as early as possible so that the scores can be reported in time for consideration.

The tests may be taken at different times. To improve a score, a test may be repeated *once*, and the score earned on the repetition will be accepted; however, the scores earned on the Scholastic Aptitude Test, which has two parts, must come from the same sitting. The total score on the Scholastic Aptitude Test must be at least 1100; the scores on the three Achievement Tests must total 1650, and the score on any one Achievement Test must not be less than 500.

Requirements for Out-of-State Applicants

GRADUATION FROM HIGH SCHOOL

The acceptability of records from high schools outside California will be determined by the Office of Admissions.

SUBJECT REQUIREMENTS

The same subject pattern as for a California resident is required (see page 19).

SCHOLARSHIP REQUIREMENTS

The scholarship requirements for a nonresident applicant are the same as those for a resident except that the scholarship average must be 3.4 or higher in the required high school subjects taken in tenth, eleventh, and twelfth years.

EXAMINATION REQUIREMENT

A nonresident applicant must take the same College Entrance Examination Board tests as those required of a resident applicant (see page 20). The test scores submitted will be used for the purposes of counseling, guidance, placement, and, when possible, in satisfaction of the Subject A requirement.

ADMISSION BY EXAMINATION ALONE

A nonresident applicant who is ineligible for admission to freshman standing and who has not attempted college work subsequent to high school (except during the summer session immediately following high school graduation) may qualify for admission on the basis of examination alone. The tests required of a nonresident applicant are the same as those for a resident except that the scores on the three Achievement tests must total at least 1725.

High School Preparatory Subjects

In addition to the high school subjects required for admission to the University, certain preparatory subjects are recommended for many University curricula to give the student an adequate background for his chosen field of study. Lack of a recommended high school course may delay graduation from the University. Details of these recommendations will be found in the bulletin *Prerequisites and Recommended Subjects*, which is ordinarily in the hands of high school and junior college counselors.

A student needing additional preparation is advised to attend one of the many excellent California junior colleges. There he can take courses applicable toward the requirements of the college or school of the University in which he wishes to enroll.

ADMISSION TO ADVANCED UNDERGRADUATE STANDING

Applicants who have registered since high school graduation in any collegiate institution, including junior colleges, summer school, or extension courses, must apply for admission in advanced standing. An applicant may *not* disregard his previous college record and apply as a freshman. However, an advanced standing applicant who has earned less than twelve units of college credit subsequent to high school graduation must satisfy the examination requirement for freshman applicants as described on page 20.

Regulations applying to admission in advanced standing are as follows:

1. Those eligible for admission from high school, but who attended another collegiate institution, must present from that institution a statement of good standing and a grade-point average of 2.0 (2.8 for nonresidents). The examina-

tion requirement described on page 20 may be disregarded in determining eligibility for freshman standing.

2. Those *ineligible* for admission from high school because of subject deficiencies may establish eligibility by completing, at an accredited college, the required courses with at least C grades, and by maintaining an average of 2.0 (2.8 for nonresidents).

3. Those *ineligible* for admission from high school because of grade-point deficiency may establish eligibility by taking, at an accredited college, a minimum of 56 acceptable semester units (or 84 quarter credits), with an average of 2.4 or better (2.8 for nonresidents).

4. Subject deficiencies of not more than 2 units may be waived for those who present the 56 or more semester units (or 84 quarter credits) and the 2.4 grade-point average mentioned above (2.8 for nonresidents). Deficiencies in excess of 2 units must be satisfied.

The University grants credit for courses consistent with its curriculum that have been completed in accredited colleges and universities. The University accepts approved transfer courses completed with satisfactory grades in the public junior colleges of the state. Frequently, students who intend to complete their advanced studies at the University will find it to their advantage to complete the first two years of the college work in a California public junior college. After a student has earned 105 quarter units (70 semester units) acceptable toward a degree, no further units will be granted for courses completed at a junior college, although subject credit may still be earned.

The acceptability of extension courses taken at an institution other than the University is decided by the Office of Admissions. The faculty of the particular school or college in which the student plans to enroll, however, decides upon the applicability of such course work in satisfaction of degree requirements. Under the Advanced Placement Program of the College Entrance Examination Board, entering freshmen may receive advanced standing credit for Advanced Placement Examinations completed with scores of at least 3, 4, or 5 on both essay and objective sections of the tests.

ADMISSION OF APPLICANTS FROM OTHER COUNTRIES

Applicants from other countries will be admitted in accordance with the general regulations governing admissions. An application, official certificates, and detailed transcripts of record should be submitted to the Office of Admissions early in the appropriate filing period (see page 25). Doing so will allow time for exchange of necessary correspondence and, if the applicant is admitted, will help him in obtaining the necessary passport visa.

An applicant from another country whose native language is not English may be admitted only after demonstrating that his command of English will permit him to profit by instruction in the University. An applicant's knowledge of English is tested by an examination given by the University. Admission of an applicant who fails to pass this examination will be deferred until he has acquired the necessary proficiency in the use of English.

Foreign students whose schooling has not been in English are urged to take the Test of English as a Foreign Language (TOEFL). Arrangements to take the test may be made in writing directly to TOEFL, Educational Testing Service, P. O. Box 592, Princeton, New Jersey 08540, U.S.A. Results of the test should be forwarded to the Office of Admissions, University of California, Davis 95616.

A student from a non-English speaking country is given college credit in his own language and literature only for courses completed in his country at institutions of college level, or for upper division or graduate courses taken in the University of California or in another English-speaking institution of approved standing.

REQUIREMENTS FOR ADMISSION TO GRADUATE STANDING

See page 134 or the *Announcement of the Graduate Division*.

SPECIAL ADMISSION CATEGORIES

In the case of a student who is technically ineligible for admission to the University, the Admissions Officer has authority and responsibility to consider other evidence of ability to pursue University work.

Conditions for admission to *special* or *limited status* are assigned by the Admissions Officer and are subject to the approval of the dean of the college or school in which the applicant plans to study. Admission is for a specified time only, and a prescribed scholarship average must be maintained. No degree can be granted to students in special or limited status. Applicants must submit transcripts of record from all schools attended beyond the eighth grade. They may also be required to take the examination in Subject A.

Special Status

Students admitted to special status are those twenty-one years of age or older who have not completed the University admission requirements but whose special attainments may qualify them for certain courses in the University toward a definite and limited objective.

No applicant will be admitted directly from high school, and only cases of unusual merit will be considered. A personal interview is usually required before final action can be taken.

A special status student will be admitted to courses for which, in the judgment of the instructor, he has satisfactory preparation. Students in this category will seldom be able to undertake the work of engineering and professional colleges or schools.

An applicant will not be admitted to special status for the purpose of making up requirements for admission to the University as a regular student.

Limited Status

Students in limited status are those with a bachelor's degree who are not candidates for an advanced degree, or those without a bachelor's degree who have completed a substantial amount of college work with a satisfactory scholar-

ship average and whose special attainments may qualify them for certain courses in the University toward a definite and limited objective.

An applicant will not be admitted to limited status for the purpose of raising a low scholarship average.

Applicants for a Second Bachelor's Degree

The second bachelor's degree is limited to students who have completely changed their objective. Those admitted to this status must indicate very strong probability of academic success.

Admission is subject to the approval of the Admissions Officer and of the dean of the school or college in which the applicant plans to enroll.

APPLICATION PROCEDURES

Applicants are expected to study the admission requirements (starting on page 19) to determine as closely as possible their eligibility before following the steps outlined below. Application should be directed to only one campus of the University.

Freshman Standing

1. Application Form

An application for admission is obtained by writing the Office of Admissions, University of California, Davis, California 95616. Applicants are urged to write early in the appropriate period as follows:

1969 Winter Quarter (begins January 2):

May 1, 1968 through November 1, 1968

1969 Spring Quarter (begins March 31):

August 1, 1968 through January 1, 1969

1969 Fall Quarter (begins September 29):

October 1, 1968 through March 1, 1969.

2. Application Fee

The completed application form accompanied by a \$10 nonrefundable application fee should be returned to the Office of Admissions as promptly as possible. (The application fee should be in the form of a check or money order made out to The Regents of the University of California.) An application received without the \$10 fee will be returned to the applicant.

3. Transcript of Record

The applicant is responsible for arranging to have transcripts sent and for insuring their early arrival at the Office of Admissions, University of California, Davis.

Students still in high school should request the school to send directly to the Office of Admissions an official transcript of all work completed through the junior year and a list of courses in progress during the final two semesters. A complete and final transcript, including a statement of high school graduation

must be submitted for each applicant by the high school from which he graduated. Any additional schools attended after an application for admission has been filed are considered to be a part of the applicant's record and are to be reported to the Office of Admissions. Transcripts and other documents submitted become the property of the University and are not returnable.

4. Notification of Eligibility

Applicants will be notified of eligibility in order of date of application providing appropriate transcripts are on file. A delay will occur if required documents or fees have not been received. Applicants will be notified of their eligibility status as soon as their records have been evaluated.

5. "Statement of Intention to Register" Form

Admitted applicants will receive a "Statement of Intention to Register" form with their notification of eligibility. The form should be completed and returned immediately along with a \$50 nonrefundable fee. This fee will be credited to the incidental fee if the student registers for the quarter in which he is accepted.

6. Smallpox Vaccination Certificate

During the registration period every new student and every student returning to the University after an absence of one or more quarters must present at the time of examination by the University medical examiners, a certificate establishing the fact that he has been successfully vaccinated against smallpox within the last three years. A form for this purpose is routinely sent to all new students.

7. Change of Campus

If, after an applicant has filed for admission, his plans change and he prefers to register on a different campus, he must write to the Director of Admissions, University Hall, University of California, Berkeley, California 94720, indicating his reason for the change. His records will be transferred to the campus he wishes to attend provided facilities are available there. Such requests must be received before the end of the filing period.

8. Reapplication

An applicant who is not eligible for admission, or one who has been admitted but does not register in the quarter for which he applied and who later desires to attend the University, must submit a new application for admission with the \$10 fee. The new application will be acted upon in light of the current availability of facilities and current admission requirements.

Advanced Undergraduate Standing

Applicants for admission to advanced undergraduate standing should follow all steps outlined above for freshman standing and in addition arrange with each college or university attended since graduation from high school to send directly to the Office of Admissions, University of California, Davis 95616, an official transcript of work completed or in progress.

Intercampus Transfer

An undergraduate student who is registered on any campus of the University, or who was previously registered in a regular session of the University and has not since been registered in another institution may apply for transfer to another campus of the University by filing the proper forms *on the campus where he last registered*. The intercampus transfer application forms and application for transcript of record forms may be obtained from the Office of the Registrar and must be filed with that office by November 1, 1968, for the 1969 winter term, by January 1, 1969, for the 1969 spring term, and by March 1, 1969, for the 1969 fall term.

Graduate Standing

An application form and information are obtained by writing directly to the Office of the Graduate Division, Room 252, Administration Building, University of California, Davis 95616.

Professional Schools

School of Law

The requirements for admission to the School of Law are described on page 117. More detailed information and the appropriate application form may be obtained by writing the School of Law, University of California, Davis 95616.

School of Veterinary Medicine

The requirements for admission to the School of Veterinary Medicine are described on page 127. More detailed information may be obtained by writing the School of Veterinary Medicine, University of California, Davis 95616. The application form may be obtained from the Office of Admissions, University of California, Davis 95616.

School of Medicine

The requirements for admission to the School of Medicine are described on page 121. More detailed information may be obtained by writing to the School of Medicine, University of California, Davis 95616.

GENERAL REGISTRATION PROCEDURE

All students must complete the necessary registration requirements. These requirements include:

1. Obtaining registration materials from the Registrar at the designated time and place. (Detailed information may be found in the *Schedule and Directory* available from the Student Bookstore on campus shortly before the opening of each quarter.)

Late registration privileges will be granted through the tenth day of instruction. A \$10 fee will be assessed to defray the extra clerical costs of late registration.

2. Preparing with the faculty adviser a study program of courses in accordance with the following regulations, and obtaining the adviser's signature on the Study List Card.
 - a. Entering students must enroll in the Subject A course if they have not satisfied this requirement (see page 34).
 - b. Students who wish to continue a foreign language studied only in high school, will take a placement test to determine the appropriate level of language ability for proper placement in class.
 - c. Maximum and minimum limits are placed on the number of units for which a student may enroll each term. These vary with each college or school. However, the University considers 12 quarter units a minimum full-time load. All students participating in student and intercollegiate activities must carry this minimum number of units.
3. Paying the prescribed fees (see page 37).
 - a. For all nonimmigrant foreign students, the Associated Students Supplementary Health Insurance program is required (see page 45).
4. Passing a physical examination given by the University Medical Examiners (see page 45).
5. Submitting a Statement of Residence. This is required of all new and returning students, including new graduates who may have been registered previously as Davis campus undergraduates, and those whose residency status has changed recently (see page 29).
6. Presenting completed registration forms and packets to the Registrar by the prescribed times (see the *Schedule and Directory*).

ADDING OR DROPPING COURSES

Adding or dropping courses after the registration materials have been submitted to the Registrar requires the approval of the adviser and the appropriate dean on a petition which is subsequently presented to the Registrar.

CHANGES OF MAJOR, COLLEGE, OR SCHOOL

With the approval of the appropriate dean or deans, a student in good standing can transfer from one area of study to another. Petition forms for this purpose may be obtained from the Registrar.

CHANGE OF NAME

Petition forms for this purpose may be obtained from the Registrar.

WITHDRAWALS

Withdrawals may be granted by the University for emergency reasons or *for good cause*. Immediately upon ceasing class attendance, students receiving veteran benefits and those who have been deferred by Selective Service because of registration in the University must report in person or write to the Dean of Students. Unauthorized withdrawals may jeopardize the student's registration privileges and result in failing grades.

READMISSION AFTER AN ABSENCE

All former students who wish to re-enter the University of California, Davis, must file an application for readmission with the Registrar. Official transcripts of all work attempted in the interim must be submitted. Final dates for filing for readmission are listed on pages 5-9.

RULES GOVERNING RESIDENCE

The residence classification of each student is determined in accordance with Section 244 of the California Government Code, Sections 23054, 23055, and 23057 of the California Education Code and the Standing Orders of the Regents. It is therein provided that a resident student is any person who has been a legal resident of the State of California for more than one year immediately preceding the opening day of the semester during which he proposes to enroll.

The attention of the prospective student who is not a citizen is directed to the fact that he is a nonresident unless, in addition to the general California residence requirements for tuition purposes, he has been admitted to the United States for permanent residence in accordance with all applicable laws of the United States. The attention of the prospective student who has not attained the age of 22 and whose parents are not California residents, and the attention of the veteran who was not a resident of California at the time of his entrance into the Armed Forces, is directed to the fact that presence in California for more than one year does not, of itself, entitle the student to classification as a resident.

Every student who is classified as a resident but who becomes a nonresident of California is obliged to notify the Registrar at once. Application for a change in classification with respect to a previous quarter will not be received under any circumstances.

A person incorrectly classified as a resident student is subject to reclassification as a nonresident. If the incorrect classification resulted from concealed facts or untruthful statements made by him, the student then shall be required to pay all tuition fees which would have been charged to him as a nonresident student. He shall be subject also to such discipline as the President of the University may approve.

The final determination of the eligibility of a student to register as a resident will be made by the Attorney in Residence Matters, 590 University Hall, University of California, Berkeley, California 94704 or by his deputy in the Registrar's office.

Students classified as nonresidents are required to pay a tuition fee of \$327 each quarter. This fee is in addition to the incidental fee. (Exemption from payment of the nonresident tuition fee may be granted to an unmarried minor whose parent is in the active military service of the United States and is stationed in California on the opening day of the quarter during which the minor proposes to attend the University. It is the responsibility of the student to file official verification of this fact from the parent's commanding officer. This verification should be addressed to the Registrar and filed when the student declares residency.)



Scholastic Requirements

EVALUATIONS

Every instructor is required to assign a letter grade for each student registered in his course. The QUALITY of a student's work will be reported in one of the following grades:

Passing work: A, excellent; B, good; C, fair; D, barely passing.

Failing work: F, work so poor that it must be repeated to receive recognition.

Undetermined: I, work is satisfactory but incomplete for good cause.

Pass (P) or Not Pass (NP): Subject to regulation by the faculties of the various colleges and schools, a student in good standing is authorized to undertake one course each term on the average on a *Passed* or *Not Passed* basis. Units thus earned shall be counted in satisfaction of degree requirements, but such courses will be disregarded in determining the student's grade-point average. Students wishing to exercise this option should familiarize themselves with the requirements of their particular college or school.

Satisfactory (S) or Unsatisfactory (U): Graduate students, under certain circumstances, may be assigned grades of S or U, but in calculating the grade-point average, units gained in this way will not be counted.

Quality points (grade points) will be assigned each grade as follows:

$$\mathbf{A = 4; B = 3; C = 2; D = 1; I \text{ and } F = 0.}$$

All grades except I are final when filed by an instructor in his end-of-term course report. No final grade except I may be revised by re-examination. A student may repeat only those courses in which he has received a grade of D or F.

Except as authorized by the appropriate dean, no student may repeat more than once a course in which he has received a grade of D or F. When a course is repeated, the units completed shall be credited toward a degree only once, but the student's grade-point average will be computed on the total number of units attempted. At each repetition the student will receive the grade assigned by the instructor and the corresponding grade points.

The QUANTITY of work attempted by the student is measured in quarter units (see page 143) which are assigned by the faculty for each individual course. To convert these units to semester units they should be multiplied by 2/3; from semester to quarter units by 3/2.

The student's course work is recorded in terms of units, grades, and quality grade points. The ratio of grade points over units attempted determines the grade-point average. The student is expected to maintain a C (2.0 grade-point average) or better on all work undertaken in the University. If he falls below a C average, he will be scholastically deficient.

SCHOLASTIC DEFICIENCIES

The following provisions apply to all undergraduate students in the College of Agriculture, Engineering, and Letters and Science.

Probation. A student shall be placed on probation if at the end of the term

his grade-point average is less than C (2.0) computed on the total of all courses undertaken in the University, including courses graded I (incomplete).

To be removed from probationary status, a student must achieve an overall grade-point average of at least C (2.0) on all work attempted in the University of California, including courses graded I (incomplete).

Dismissal. A student shall be subject to dismissal from the University if:

a. His grade-point average falls below 1.5 for any term, or

b. After one term on probation he has not achieved an overall grade-point average of at least C (2.0) on all work attempted in the University of California, including courses graded I (incomplete).

The School of Veterinary Medicine has the following provisions:

Probation. A student shall be placed on probation if at the close of his first term in the School of Veterinary Medicine his record for that term falls below a C average, computed on the total of all courses taken in the veterinary medical curriculum.

Dismissal. A student shall be subject to dismissal from the School of Veterinary Medicine:

a. If at the end of any term subsequent to his first he has failed to maintain a grade-point average of 2.0 (a C average), computed on the total of all courses taken in the veterinary medical curriculum, subsequent to his admission to the School, for which he has received a final report; or

b. If during any term he fails to pass with a grade of C or higher courses totaling at least 4 units; or

c. If at any time he has, in the judgment of the faculty of the School, failed to meet the professional and ethical standards of the profession of veterinary medicine.

A student who fails to meet the minimum scholastic requirements specified above is subject to such supervision as the faculty of his college or school may determine. The faculty may:

a. Dismiss such a student from the University, or

b. Suspend his dismissal, continuing him on probation, or

c. Authorize the return on probation of a dismissed student.

To transfer from one campus of the University to another, or from one college or school to another on the same campus, a student who has been dismissed or is on probation must obtain the approval of the dean whose jurisdiction he is seeking. After making the transfer, the student is subject to the supervision as provided in the above.

Graduate students with scholarship deficiencies are subject to action at the discretion of the Dean of the Graduate Division.

TRANSCRIPTS OF RECORD

Upon written request to the Office of the Registrar, a student will be provided with an official transcript of his work completed at the Davis campus of the University of California. Work completed at any other University campus

or any other institution must be requested directly from the school concerned. University Extension transcripts must be requested from the University Extension Office, University of California, Berkeley, California 94720.

A fee of \$1 per copy of each graduate and each undergraduate record should accompany each request. Graduate and undergraduate transcripts are individual records and must be requested separately.

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

MID-TERM WARNING NOTICES

Students wishing to know their class standing at the mid-quarter may inquire from their instructor. Those who have deficient grades (D or F) should confer with their adviser. The Dean of Students Office may also be of assistance.

FINAL EXAMINATIONS

The *Schedule and Directory* lists the final examination groups. This information is available at the beginning of the term so that students can avoid final examination conflicts.

Final examinations are mandatory in all undergraduate courses, except as follows:

a. They are not normally required in laboratory courses or their equivalent; however, a department, at its option, may require a final examination in any laboratory course if prior announcement has been made in the *Schedule and Directory*.

b. Final examinations may be omitted in any undergraduate course with the approval of the appropriate committee on courses and upon recommendation of the department concerned.

Wherever practicable, final examinations are written and must be completed within a previously announced time limit. Examinations in non-laboratory courses may not exceed two hours.

Under certain prescribed conditions a student may receive Credit by Examination without formal enrollment in a course. The rules governing such examinations may be obtained from the Registrar.

Final grade notices will be sent to the student if, before the end of the term, he has deposited with the Registrar a self-addressed, stamped envelope.

GRADUATION REQUIREMENTS

Three groups of requirements must be satisfied before the student can become eligible for candidacy for the bachelor's degree. They are: 1) college or school requirements, 2) individual departmental requirements, which are all specific and vary as to particulars; and 3) the University requirements, which are general and apply to all schools and colleges. For information on college, school, or departmental requirements see the appropriate section of this catalog.

The University requirements are as follows:

Subject A: English Composition

Every entering student must satisfy the Subject A requirement. This requirement is designed to assure a level of competence in written English essential to his satisfactory progress as a University student. The requirement can be met:

1. By achieving a grade of 5, 4, or 3 in the College Entrance Examination Board (CEEB) Advanced Placement Examination in English, *or*
2. By achieving a score of 600 or higher in the CEEB Achievement Test in English Composition, *or*
3. By achieving a score below 600 but above 470 in the CEEB Achievement Test in English composition and writing an acceptable Subject A writing sample, *or*
4. By entering the University in advanced standing and writing an acceptable Subject A writing sample, *or*
5. By entering the University with credentials showing the completion of an acceptable college-level course in English composition with a grade of C or better.

The Subject A writing sample, which is constructed by the Subject A Committee, is administered at centers throughout the state on the last Saturday in April, and is also offered on campus at the opening of each quarter. A fee of \$5 is charged for the writing sample. Students who have *not* been notified of their score on the Achievement Test in English Composition at the time of the April writing sample should not take the writing sample until the opening of their first quarter in the University, if it is then necessary.

Satisfaction of the Subject A requirement is determined by the Office of Admissions. Students not meeting the requirement in one of the ways described above must enroll in the non-credit course in Subject A during their first quarter of residence in the University. A fee of \$45 is charged for the course.

Foreign students whose native language is not English can meet the Subject A requirement by passing a special examination in English Composition, and if necessary, completing Rhetoric 26 with a minimum grade of C.

American History and Institutions

Every student must demonstrate a knowledge of American History and Institutions. Every graduating student should 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.

He may meet this requirement in any of the following ways:

1. By passing a special examination in American History and Institutions. No unit credit is given for completing this requirement by examination. Beginning in fall, 1968, this examination will be given to all entering students, freshmen and transfers, who have not already fulfilled the requirement. The exam will be given at the start of the fall, winter, and spring quarters. Continuing students can also take the examination.

2. By completing any two of the following courses: History 17A, 17B, 170A, 170B, 170C, 171A, 171B, 171C, 174A, 174B, 175A, 175B, 176A, 176B

178A, 178B, 179A, 179B, 180, 183A, 183B; Political Science 1A, 1B, 100, 102, 103, 104, 105, 106, 113, 128A, 163, 164, 166; Economics 111. Students taking these courses are subject to the regular rules that apply for prerequisites and majors. Upper division history courses may be taken to satisfy the requirement only with the permission of the instructor. Other courses not on the list may be used to satisfy the requirement, but approval must be obtained from the Supervisor.

3. By presenting evidence that the requirement has been satisfied at another collegiate institution whose credits are acceptable for transfer to the Davis campus of the University of California.

4. By successful completion of the Advanced Placement Examination in American History.

Foreign students studying at the University on F class (student) or J class (exchange visitor) visas should call at the American History and Institutions office to secure exemption from the requirement. They should bring their passports, visas, and registration cards with them.

Further information may be obtained from the Supervisor of the American History and Institutions Requirement, 227 Voorhies Hall.

3

Residence Requirement

The minimum residence requirement for a bachelor's degree at the University of California is one academic year. Each summer session in which a student completes a course of at least 3 quarter units may be counted as half a quarter's residence. Thirty-six of the final 45 quarter units completed by each candidate must be earned in residence in the college or school of the University of California in which the degree is to be taken. No more than 18 of the 36 quarter units may be completed in summer session courses on the campus of residence.

Exceptions to this rule are candidates for the Bachelor of Laws degree, and those who have been in the military service. With the approval of the dean of his 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 award of the degree may be recommended for the degree after only one quarter of University residence in which he completes at least 16 units or passes a comprehensive examination in his major or field of concentration.

Scholarship Requirement

To receive a bachelor's degree, except the Bachelor of Laws, a student must obtain twice as many grade points as units for all courses attempted by him in the University. An exception to this rule is authorized for honors students undertaking certain courses (see "Credit by Examination" page 33).

Unit Requirement

Every candidate will normally present a minimum of 180 quarter units as partial satisfaction of the requirements for the bachelor's degree.

Filing for Degree Candidacy

Each candidate for graduation must file an Announcement of Candidacy with the Registrar at the beginning of the quarter in which he plans to graduate. The dates for filing are published on pages 5–9 of this catalog and in the *Schedule and Directory*.

HONORS AND PRIZES

Honors at Entrance

All entering freshmen are considered for Honors at Entrance on the basis of outstanding scholarship achieved in high school. Certificates are presented to the honors recipients shortly after registration in the University.

Deans' Honors List

The names of all students who have completed a minimum of 12 units of work on the Davis campus and who have achieved a 3.0 grade-point average or better in all work undertaken in the University and in the college will be listed by the various deans and submitted to the Registrar for publication in the *Student Directory* the following quarter. Students achieving this distinction have the following privilege.

Credit by Examination. Honors students may request credit by examination in courses without formally enrolling in them, or in subjects appropriate to the student's curriculum but not offered as courses in the University. Arrangements should be made with the dean, and his approval and that of the instructor appointed to give the examination are necessary before the examination can be given. Application forms for such examinations may be obtained from the Registrar.

Graduation Honors

Graduating students may qualify for honors, high honors, or highest honors. The names of recipients are published in the commencement program and the appropriate notation is made on their diploma and on their permanent record in the Registrar's Office.

Prizes

Prizes for student achievement and scholarship on the Davis campus consist of inscribed plaques and cash awards. The University Medal is the highest honor awarded to a graduating senior in recognition of superior scholarship and achievement. In addition, a College Medal is given to the outstanding graduating senior of each of the colleges and professional schools.

Student Expenses, Housing, and Financial Aids

FINANCIAL AIDS PROGRAM Introduction

The primary purpose of the Financial Aids Program at Davis is to provide financial assistance and advice to students who would be unable to pursue their education at the University without such help. In addition to budgetary advice and counsel, financial assistance consists of scholarships, grants, loans, and employment offered singly or in various combinations to meet the difference between the student's resources and the cost of attending the University.

In determining the type and amount of financial assistance necessary to meet a student's financial deficit, the University expects the parents to make a maximum effort to assist their sons and daughters with college expenses. It also expects that all students will provide a part of the total cost of attending the University from summer employment. The financial assistance given by the University of California, Davis, should be viewed only as supplementary to the assistance and resources of the applicant and family. The desire to be independent of parents and reject their support is not held to be a valid reason for being granted financial aid.

The following information will introduce you to the various types of financial assistance available on the Davis campus as well as the procedures for making application for assistance. We invite you to make further inquiries about our Financial Aids Program and about the various ways in which you might finance your education.

EXPENSES

If you are a legal resident of California, you are not required to pay tuition at the University. (Students classified as nonresidents must pay tuition of \$980 per year.) Nevertheless, there are certain other expenses, such as supplies, room and board, and incidentals, that you will have to consider. Although you must determine your own budget in keeping with your needs and resources, you may find the following approximated costs a helpful guide:

		<i>Annually—</i>
	<i>Quarterly (3 Quarters)</i>	
Memorial Union fee \$3.50 and Student Body membership \$5.00)	\$ 81.50	\$ 244.50
Room and board		**1,077.00
Books and supplies	55.00	165.00
Student Health Insurance*		22.00
Parking of cars on campus*		16.00
Subject A (if needed, see page 34)	45.00	

* Optional.

** Subject to change.

	<i>Annually</i>	
	<i>Quarterly</i>	<i>(3 Quarters)</i>
Registration (<i>Cont.</i>)		
Miscellaneous (includes travel, laundry, recreation, etc.—approximate costs).....	\$180.00	\$512.00
Total for California residents	\$ 676.50	\$2,000.00
Tuition for nonresidents	327.00	980.00
Total for nonresidents (approximate costs)	\$1,003.50	\$2,980.00

Students should have enough funds with them at the beginning of the fall quarter to cover registration fees, books, and the first month's room and board, as scholarship and loan checks will not be available until after registration.

Refunds. For students who withdraw with official approval before the end of any quarter, part of the fees enumerated above may be refunded. A schedule of refunds and other information will be found in the circular *Student Fees and Deposits*, obtainable from the Registrar.

APPLICATION PROCEDURE

Application forms may be obtained from the Office of Financial Aids, South Hall, University of California, Davis, California 95616.

Application Form. To facilitate the granting of monies to students, one application form has been developed to handle all of the scholarships, loans (including NDEA and Educational Opportunity Grants), and Work-Study jobs administered by the Davis campus.

The application, which consists of the student's personal and budgetary information, plus the Parents' Confidential Statement, is reviewed by the financial aids committees to determine the eligibility for, and dollar amount of, a scholarship, loan, grant, employment under the Work-Study Program, or a combination of these to be awarded.

Thus, a student applicant is first considered for a scholarship, and then is automatically considered for a grant, a loan, and/or a job until the student's financial need (the difference between student and family resources and the cost of attending the University) has been met.

A Parents' Confidential Statement must accompany the student's personal and budget information page in order for the application to be complete and to permit an evaluation of need. The Parents' Confidential Statement form may be obtained from the high school or college and must be sent to the College Scholarship Service, P.O. Box 1025, Berkeley, California 94701 for evaluation not later than two weeks before the application deadline (see below).

Application Deadline. Applications are available in November for the following academic year. In order to be given consideration for a scholarship, the application must be received by the Financial Aids Office no later than

February 1—for continuing students

February 15—for entering students

For other types of financial assistance (loans, jobs, grants) applications must be received no later than

April 15—for continuing students

June 30—for entering students

Applications submitted after these dates will be considered only as funds become available.

NOTIFICATION OF AWARDS will be made to students by

April 30—for scholarships

August 15—for other types of financial aid, i.e., work-study, loans, etc.

SCHOLARSHIPS

Regents Scholarships. This award, granted by the President of the University and the Chancellor of the Davis campus, is one of the highest honors that may be conferred upon an undergraduate student. Recipients are selected on the basis of academic excellence and exceptional promise. Students are eligible for Regents Scholarships upon graduation from high school or upon completion of the sophomore year at the University, at one of California's public junior colleges, or at another accredited collegiate institution. All scholarship applicants who meet these qualifications are considered for this award.

The stipend accompanying each scholarship is based on the student's financial need. Awards may be honorary in nature or may be accompanied by a stipend to cover the difference between family resources and the yearly standard cost of education at the University. All Regents Scholars receive an honorarium of \$100 annually, regardless of financial need. *If you wish* to be considered for a Regents Scholarship with honorarium only, you should so indicate, and you need not file a Parents' Confidential Statement.

The term of appointment is four years for students entering from high school (three and one-half years for midyear entrants who will have completed one semester of college work) and two years for students appointed on completion of the sophomore year. Regents Scholars are expected to maintain at least a "B" average in course work undertaken at the University.

President's Scholarships. These one-year awards are made annually to entering and continuing students, including junior college transfers. They are granted by the President of the University and the Chancellor of the Davis campus. Again, all scholarship applicants are considered.

President's scholarships are awarded on the basis of scholastic attainment, financial need, and promise. The award carries a maximum stipend of \$500. In cases where the established financial need exceeds this amount, the awards will be supplemented by additional scholarship funds, grants, loans and/or part-time work under the College Work-Study Program.

University, Alumni, Endowed, and Agency Scholarships

These scholarships are made possible through funds provided by individual donors, private corporations and agencies, the alumni associations and The Regents of the University.

Most scholarships are open to all undergraduate students on a competitive basis. Although some are restricted by the donors to recipients who meet given criteria, such as majors in food science, entomology, biochemistry, home economics, etc., students need not apply for any specific scholarship, but should indicate on the application form all the listed qualifications which they can satisfy.

These scholarships, with the exception of some agency grants, are awarded by the Chancellor of the Davis campus on the advice of the faculty. They are granted on the basis of academic achievement, financial need, and promise.

Normally, scholarships are awarded for one year; financial assistance for succeeding years will depend upon the academic performance in the University and continued financial need. A "B" average in the University is generally required for a recipient to be considered for awards after the first year.

EDUCATIONAL OPPORTUNITY GRANTS

Eligibility for Educational Opportunity Grants is limited to undergraduate students of exceptional financial need, as measured on an absolute scale of parent contribution which has been established by the Federal Government. Upon receipt of the Financial Aids Application and the Parents' Confidential Statement, parent contribution is determined by the Financial Aids Office using College Scholarship Need Analysis procedures. The amounts of the grants range from \$200 to \$800 per academic year. The amount of grant may not exceed one-half of the total financial aid award, as the grant must be matched on an equal basis with some other form of financial aid (i.e., a scholarship or loan from the University, or a scholarship or loan from outside sources).

COLLEGE WORK-STUDY PROGRAM

The College Work-Study Program, established under the Economic Opportunity Act of 1964, enables the University to offer employment to financially needy students during the school year and vacation periods. The program is designed to assist those students who are from low or middle-income families, who need funds to continue their education, and who are enrolled or accepted for enrollment for a full-time course of study at the University. The on-campus and off-campus jobs are limited to an average of 15 hours per week during the school year and are specifically awarded to assist students in meeting their college expenses and in gaining valuable work experience related to their educational endeavors. In other cases of demonstrated financial need, Work-Study jobs may be awarded during the summer on a full-time basis.

These jobs should not be confused with the employment offered by the Student Placement Center, as the jobs under the Work-Study Program are limited to those students having a definite financial need.

LOANS

National Defense Education Act Loans (NDEA). Regularly enrolled students, or applicants for admission to the University, who are United States citizens or permanent residents of the United States, are eligible for National Defense Student Loans to meet their financial need.

The maximum loan that any *undergraduate* student may obtain for one academic year (three quarters) is \$1,000 or a fraction thereof for one or two quarters. The total amount which may be borrowed by undergraduate students under this program is \$5,000, and includes loans granted by other institutions of higher education. For graduate students, the maximum for one academic year (three quarters) is \$2,500 or a fraction thereof for one or two quarters. The total that may be borrowed by graduate students under this program is \$10,000 (includes loans granted as undergraduates and by other institutions of higher education). However, when demand exceeds the funds available, loans will be granted on a competitive basis and amounts restricted. Special consideration will be given to students with superior academic background, regardless of major.

Repayment of NDEA loans begins nine months after graduation or withdrawal from the Davis campus and may be extended over a ten-year period at 3 per cent interest on the unpaid balance. Members of the armed forces, members of the Peace Corps, members of VISTA, and students who transfer to other schools may defer payment and extend the repayment period.

Up to 50 per cent of the loan (and interest thereon) may be forgiven those entering the teaching profession, at the rate of 10 per cent for each year of full-time teaching in public or nonprofit (1) elementary and/or secondary schools or (2) institutions of higher education. An additional cancellation of 5 per cent is made for each year of service as a full-time teacher in a public or other non-profit elementary or secondary school which, as defined by the Commissioner of Education, has a high concentration of students from low-income families. Hence, the total amount of the loan may be cancelled by teaching in a deprived area for seven years.*

Regents Loan Funds. These funds are principally used to supplement stipends of scholarship and fellowship recipients but may also be granted to other qualified students. Regents Loans, normally repayable in five years, bear an interest rate of 3 per cent on the unpaid balance, beginning upon graduation or withdrawal from the University of California. Students who undertake graduate studies at the University of California may defer payment until they complete or terminate such studies.

Short-Term Loans. To be eligible for a short-term loan, a student ordinarily must have attended the University for at least one quarter. These funds, made possible by gifts to the University, are granted in small amounts to help students with educational expenses. Although repayment schedules are determined individually for each loan, these loans are unusually repaid within the academic year or with earnings from employment the following summer.

Emergency Loans. Loans not to exceed \$100 are available for emergency educational expenses. Repayment is normally made within 30 days. Interest at the rate of 1 per cent per month is charged on the unpaid balance after the loan has been outstanding more than 30 days.

* Beginning with the academic year 1967-68 cancellation will be granted at the rate of 15 per cent per year for the teaching of handicapped children, and there will be no limitation on the amount of the loan which may be cancelled at that rate.

MISCELLANEOUS

Graduate Scholarships and Fellowships. Information about scholarships or fellowships, etc., for graduate students may be obtained from the Dean of the Graduate Division, Room 252, Administration Building. Applications for fellowships and graduate scholarships must be filed with the Dean of the Graduate Division, University of California, Davis 95616 not later than February 1 prior to the academic year for which the award is sought.

Army ROTC Scholarship Program. Applications may be obtained from the Department of Military Science, University of California, Davis 95616 during the month of April. Selection will be based upon academic and military records and potential officer qualities. Notification will be made before July 15 of each year.

Veterans Benefits. Students who qualify for veterans benefits under the new program established on July 1, 1966, by Public Law 89-358, will be certified to the Veterans Administration by the Financial Aids Office.

Eligibility for educational benefits is dependent on service in the U. S. Armed Forces for at least 181 days, any part of which was after January 31, 1955. For each month of active duty, a veteran is entitled to one month of educational assistance, up to a maximum of 36 months. The allowance for a single student enrolled in a full-time course of study is \$130 per month. Married students will receive \$155 per month, or \$175 with one child. For each additional child the allowance is increased by \$10 per month.

Application forms for veterans benefits may be obtained in the Financial Aids Office as well as the Regional Office of the Veterans Administration. These should be filled out and submitted to the Veterans Administration, Regional Office, 49 Fourth Street, San Francisco, California 94103. This should be done well in advance of the date of enrollment in the University.

Dependents of deceased or disabled veterans are entitled to certain educational benefits under California and Federal laws. Certification of their enrollment is also a function of the Financial Aids Office.

Guaranteed Loans. The Federal Government, the State of California, California lenders (banks, credit unions, and savings and loan associations) and California colleges are partners in a program to provide students with loans to help them in financing their education beyond high school. Under this plan the State Scholarship and Loan Commission, utilizing federal funds, guarantees the repayment of loans made to students by California lending institutions. Under the plan adopted by the State Scholarship and Loan Commission, students whose adjusted family income is under \$15,000, who are legal residents of the State of California for educational purposes; are citizens of the United States or admitted as permanent residents; are full-time students as defined by his college and the U. S. Commissioner of Education; are undergraduates or graduates in degree, credential, or certificate programs; *who agree to use the loan funds only for educational purposes*; are in good standing as defined by their college or accepted for admission; and have a social security number, are eligible to

receive a State-guaranteed loan. Such students are also eligible to receive a complete interest subsidy of 6 per cent while they are full-time students and 3 per cent or one-half of the interest after they cease to be full-time students which is also the time when the repayment of the principal of the loan commences. The maximum loan for all full-time students is \$1,000 per academic year.

Separate applications for this program are available in the Financial Aids Office, South Hall.

LIVING ACCOMMODATIONS

Residence Halls

The University provides housing for approximately 2,900 students in a variety of residence halls on campus. There are five coed halls of 400 students each; one 200-student coed hall; one 200-student hall for men; and two 200-student halls for women. Each of these halls is staffed with professional personnel who work in conjunction with the residents, striving to create and maintain an environment conducive to educational goals.

Each hall elects its own student officers to act on matters such as student government, planning programs, and helping to solve problems of student discipline. Annual hall dues average about \$12. The Residence Hall Association is a coordinating governing body for all of the residence halls.

The room and board rate (which includes 20 meals a week) for the 1967-68 academic year was \$960 and is subject to change. All students planning to live in residence halls sign a contract for one academic year. Payment is usually made in installments according to a payment schedule. Rooms in the residence halls contain all of the necessary furniture and also include study lamps, linen, and blankets. Telephones and weekly laundering of linen are included in the room and board rate. Further information and applications for housing are sent when students apply for admission to the University. Specific questions should be directed to the Housing Office, South Hall, University of California, Davis 95616. Since accommodations are limited, early application is advised. (A change in the room deposit policy was under consideration at the time of publication. Last year a deposit of \$100 was required when a contract was signed and returned and was not refundable after June 15.) An additional \$25 for damage and loss deposit is required of new students and remains with the University until the student terminates University housing.

Housing for Married Students

There are 475 apartments for married students on the Davis campus. Some of these apartments have one bedroom, but most are two-bedroom units. Both furnished and unfurnished accommodations are available. Apartment rates for 1967-68 were: one bedroom, unfurnished, \$83; two bedrooms, unfurnished, \$95; two bedrooms, furnished, \$110. Rates include water, gas, trash collection, and electricity. Applications for these units can be obtained by writing the Married Student Housing Office, South Hall, University of California, Davis 95616.

Off-Campus Accommodations

The Housing Office maintains a listing service for those interested in off-campus housing. Students, faculty, and staff associated with the University should contact this office for assistance in locating off-campus accommodations.

Approximately 700 students are housed in privately owned off-campus residence halls. These halls meet all the standards of approval set by the University and adhere to the same rules and regulations that apply to the University residence hall. They have their own dining facilities.

Students who live off-campus may take advantage of either of two food plans which allow them to eat in the University residence hall dining rooms.

Fraternities

Thirteen national fraternities are represented on the Davis campus, providing living quarters and meals for their more than 600 undergraduate members and pledges. The fraternities, under their system of self-government, provide social, recreational, and academic programs for their members as well as some experience with business activities. A faculty member acts as adviser for each fraternity. The cost of living in a fraternity is comparable to that of the residence halls. Fraternities meet recommended housing standards.

Membership in fraternities is by invitation. Men who are interested in fraternities should write or call on the Assistant Dean of Students for Fraternities.

The national fraternities are—Alpha Gamma Rho, Delta Upsilon, Delta Sigma Phi, Chi Phi, Kappa Sigma, Phi Kappa Tau, Phi Delta Theta, Phi Sigma Kappa, Sigma Alpha Epsilon, Sigma Phi Epsilon, Sigma Nu, Theta Chi, Theta Xi.

Student Services and Activities

STUDENT HEALTH PROGRAM

Medical Evaluation

To safeguard the health of the student and the University community, every new student, as a part of registration, must have an examination by the University Medical Examiners. Every new student must have at the time of registration a certificate of successful vaccination against smallpox performed within the last three years. A form for this purpose is provided by the University. Tests for tuberculosis are a part of the physical examination of all new students.

Applicants with contagious diseases will be excluded. Any having physical conditions that grossly disturb the classwork of other students should not apply for admission and will be disqualified when detected.

Each prospective student is advised to have a physical examination by his own physician to determine his fitness for college work before coming to the University. Any defects capable of remedial treatment, such as diseased tonsils or imperfect eyesight, should be corrected to prevent possible loss of time from studies.

Students returning after an absence must comply with the University requirements regarding smallpox vaccination and must have a health evaluation at the Student Health Service.

Supplementary Health Insurance

A supplementary health insurance plan is available at the time of registration. This insurance supplements the Student Health program and is used for medical care needed between quarters and when away from the campus. It likewise provides for surgical-professional fees and other benefits as outlined in the Supplementary Health Insurance brochure. Procurement of this insurance is strongly urged, and a waiver must be signed if it is not obtained.

Foreign Students. The acquisition of health insurance is a condition of registration for all nonimmigrant foreign students. At the time of registration, all nonimmigrant foreign students will enroll in the Associated Students supplementary health plan. Students who present documentary evidence of equivalent insurance coverage or sponsored students who do not pay the incidental fee may petition the Office of International Student Services for permission to waive the Associated Students Supplementary Health Plan.

Student Health Service

The Student Health Service, by preventing and treating acute illnesses, conserves the time of students for their classwork and studies. This service is made possible, for the most part, by the incidental fee. It is not a health insurance. The service is limited by the staff and facilities available.

Each regularly enrolled student may have such medical care as the Student Health Service is staffed and equipped to provide from the first day of the

quarter through the last day of the quarter. Additional services may be provided for seven days after the last day of the quarter at the discretion of the Director of the Student Health Service. Hospitalization up to ten days per quarter be provided for illnesses. When, in the opinion of the Director of Student Health, serious illness or injury requires prolonged care and will obviously prevent continuation in college during the current quarter, the patient will be returned to his community or home for definitive treatment.

The Student Health Service does not take responsibility for dealing with chronic physical defects or illnesses present at the time of entrance to the University. Except for first aid and emergency care, the Student Health Service does not assume responsibility for dental treatment. It does not take responsibility for treatment of remedial defects where medical or surgical treatment is elective and not of an emergency nature, and where the student's best interest will be served by treatment during vacation.

The Student Health Service is designed as a medical facility to provide medical care while the student is away from home and in attendance at the University; it does not supplant the medical care of the family physician. Full cooperation is encouraged between the student, the Student Health Service, and the family physician.

STUDENT AND ALUMNI PLACEMENT SERVICES

Placement advisers assist students who wish to locate initial positions following graduation and aid students in locating part-time and/or summer employment whether for reasons of financial need or work experience. Students dropping out of the University for a term or longer who are interested in employment or military service should see a placement adviser. The services of the Placement Center are available without cost to students and alumni.

Student Part-Time and Summer Employment

Many students who attend the University expect to earn part of their expenses. However, the undergraduate curricula are organized on the assumption that a student will give most of his time and attention to college studies. If possible, the student should avoid outside employment until he has become adjusted to his new environment, has established sound study habits, and is maintaining a good scholastic standing. By the end of the first quarter the student should know the demands of University life and his own capabilities well enough to plan a program combining studies and work.

Placement advisers help students to find part-time and summer employment. The office receives job listings from employers and refers qualified students to these openings. To receive assistance students must be interviewed personally, as satisfactory arrangements cannot be made by correspondence. Interested students should register with the Part-Time and Summer Employment Division after arriving on campus.

Career Placement Service

Students and alumni seeking careers in business, industry, agriculture, and government are invited to use the services of the Placement Center. Placement

advisers discuss matters of job choice and methods of obtaining jobs with registrants. In addition, they arrange employment interviews, receive job listings from employers, and refer suitable registrants to these employers. Graduating students regardless of impending military service, graduate school or other plans are encouraged to register with the Placement Center early in their final year of study. Alumni may use the placement services for initial or subsequent placement at any time.

Educational Placement Service

Placement service is available to students and alumni who are interested in teaching. Information on the background, training, and professional experience of its candidates, which is kept in confidential files, enables this office to match qualifications with specifications of available positions. Placement advisers counsel candidates, communicate with employers, receive vacancy data, and arrange interviews. The University reserves the right to refer only those persons who are considered to be fully qualified.

Occupational Information

A library of vocational information is maintained by the Placement Service and the Counseling Service (see below). Students may use this library at their convenience. Placement advisers are willing to discuss various occupations with students throughout their academic careers.

COUNSELING CENTER

The Counseling Center is staffed with psychologists, who provide educational, vocational, and personal counseling to all regularly enrolled students. Through individual interviews and group discussions, they

5

Help students with personal problems.

Assist students in their choice of academic majors and future occupations.

Establish developmental-reading classes and study-skills classes on a non-credit, voluntary basis.

Provide a wide range of psychological testing when appropriate.

Make available information about various occupational opportunities for which students may wish to prepare.

Work with students who are involved in the process of self-exploration.

SELECTIVE SERVICE

The Office of the Dean of Men assists students who have inquiries and problems with their status regarding Selective Service. It is up to each individual, however, to request educational or other deferments from his local draft board, which has exclusive authority over all deferments. The Dean of Men's Office will, upon request of the student, certify information about the student's educational progress to the local board.

Students attaining their eighteenth birthday and unable to register with their local board because of attendance at Davis, may register for Selective Service at the Office of the Dean of Men.

Under present Selective Service regulations, any student who receives an educational deferment extends his liability to age 35. Students desiring a deferment on the basis of participation in the University ROTC program should consult the Department of Military Science.

All male students (undergraduate and graduate) will find it to their advantage to continually keep themselves aware of Selective Service laws and procedures. Any question or request for assistance may be brought to the Office of the Dean of Students at any time.

MILITARY SCIENCE

The University has an Army Reserve Officers' Training Corps unit that offers both basic and advanced courses in general military science at Davis. Enrollment in military science is on a voluntary basis. The ROTC Program is described in detail with the course offerings of the Department of Military Science.

INTERNATIONAL STUDENT SERVICES

International Students

An adviser is available to assist students from abroad in all matters pertaining to their attendance at the University and to their residence in the United States.

Education Abroad

Administrative assistance in the nonacademic aspects of the University's Education Abroad Program (see page 16) is provided by the Office of International Student Services. Application forms and information about the program may be obtained at this office, as well as information regarding other aspects of travel and study abroad.

Information pertaining to other means of study, travel, and employment opportunities abroad is also available in the Office of International Student Services.

STUDENT CONDUCT AND DISCIPLINE

Students enrolling in the University assume an obligation to conduct themselves in a manner compatible with the University's function as an educational institution. If a student fails to meet this responsibility or neglects his academic duties, appropriate action may be taken.

Administration

The President of the University, through the Chancellor, has ultimate authority for the administration of student discipline. Assistance in this area is provided by members of the teaching staff, the administrative officers concerned with student welfare, the Student Conduct Committee, and several student hearing bodies.

Types of Discipline

The major types of discipline are:

Warning: Notice to the student that continuation or repetition of specified conduct may be cause for other disciplinary action;

Censure: Written reprimand for violation of specified regulation;

Disciplinary Probation: Exclusion from participation in privileges or extra-curricular University activities as set forth in the notice of disciplinary probation for a specified period of time;

Restitution: Reimbursement for damage to or misappropriation of property. Reimbursement may take the form of appropriate service to repair or otherwise compensate for damages;

Interim Suspension: Exclusion from classes and other privileges or activities as set forth in the notice of interim suspension, pending final determination of an alleged violation;

Suspension: Exclusion from classes and other privileges or activities as set forth in the notice of suspension for a definite period of time;

Dismissal: Termination of student status for an indefinite period. The student may be readmitted to the University only with the specific approval of the Chancellor of the campus to which he applies;

Expulsion: Permanent termination of student status without possibility of readmission to any campus of the University.

Student Honor Council

The Honor Council of the Associated Students deals with student welfare, student conduct, student-faculty relations, and ASUCD Constitution interpretation. The Council fosters the honor spirit, a code which places the responsibility for classroom and campus conduct with the individual student.

5

THE ASSOCIATED STUDENTS AND STUDENT ACTIVITIES

The entire undergraduate student body holds membership in the Associated Students, University of California, Davis (ASUCD). The ASUCD, through its elected Legislative Assembly and appointed activities chairmen, is responsible for organized student activities on campus.

Independent student organizations are administered by the Dean of Students Office. Included in this category are departmental, honor, service, special-interest, political, and religious organizations, as well as an International Club.

A major effort of the ASUCD is *Picnic Day*, the campus open house welcoming the public each spring. Other special ASUCD events or activities include *Judging Day* (competition in agricultural skills and knowledge for high school students), *Little International* (livestock show for Aggie students), *Cal Aggie Camp* (an annual summer encampment for underprivileged children in the area, financed by student fund-raising events), *Cal Aggie Study Center Project* (a weekly tutoring program for disadvantaged primary and secondary school children in Sacramento area schools), *Homecoming*, *Wild West Days*, *Radio KCD*,

Speakers Bureau, Student Forums, Blood Bank, and the all-important Orientation for incoming students. The University Band is supported by the ASUCD, and the Memorial Union Student Council presents in the Memorial Union a continuing educational and recreational program for students, as well as a concert series and a Spring Festival of the Arts.

The ASUCD publishes the *California Aggie*, a daily campus newspaper; *El Rodeo*, the yearbook; and *Motley*, a literary magazine.

The *Associated Women Students* is composed of all undergraduate women



students. It is an organization concerned with the general welfare of the women students and their role in the social, cultural, and intellectual activities of the University.

Davis students join those of all other University campuses in All-University festivals featuring the arts, intramurals, and a graduate academy.

The University of California, Davis, is a member of the Far Western Inter-collegiate Athletic Conference and stresses intramural and recreational as well as intercollegiate athletics. Included are football, basketball, track, rifle, baseball, tennis, wrestling, golf, swimming, and water polo. Independent student clubs provide opportunities to participate locally or in independent leagues in the following activities: rugby, cricket, badminton, rodeo, gymnastics, sailing, skiing, fencing, judo and karate. The Women's Athletic Association sponsors sports and recreational activities for all women students, including intercollegiate playdays in basketball, volleyball, hockey, softball, badminton, tennis, rifle, and swimming.

Unity of student life on all campuses of the University is emphasized by the California Club, an organization of student leaders.



Requirements and Curricula

COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES

Curricula in the College are career oriented. The agricultural industry was founded on activities related directly to farming and ranching, but now presents opportunities so diverse that graduates are sought for nearly all areas of the physical, biological, social, and management sciences. The employment spectrum is consequently much wider than is generally realized.

Today, rapid and dramatic technological changes are taking place in the broad fields of agriculture and resource management. Such transformations include changing methods of production, processing and marketing, development of new products, and expanding research. Agriculture is showing increasing concern for related socio-economic problems, and greater involvement with man's environment and use of renewable natural resources for the benefit of the total society. Agriculture has become so broad and diverse that many different talents are needed. It is no longer necessary for a student to have a rural background.

Since food is now and will continue to be the most critical universal concern of populations throughout the world, international agriculture also offers expanding opportunities for leadership and service.

Career opportunities are no longer restricted to rural areas, or to men. Women are finding increasing employment as agricultural scientists, particularly in areas of concern to the family and consumer.

To prepare students to excel now and to keep abreast of inevitable changes in the future, curricula in the College are designed to produce graduates with both fundamental and in-depth, technical training. A distinctive feature of the College is its multidisciplinary approach, i.e., focusing of several disciplines on the solution of problems. Students first establish a foundation in the natural sciences, social sciences and humanities, and then in their upper division work develop competencies in chosen areas of agricultural, biological, or family and consumer sciences.

Requirements for the Bachelor of Science Degree (page 81)

Programs Offered

The specific requirements of the various curricula and majors are described beginning on page 55. They differ greatly in their emphasis and therefore offer a broad spectrum from which to choose. Areas of emphasis include the following majors:

Family and Consumer Science Programs (page 55)

Child Development (page 57), design (page 57), dietetics and nutrition (page 57), foods (page 57), home economics (page 57), textile science (page 58).

Agricultural Sciences Programs (page 58)

Agricultural business management (page 63), agricultural economics (page 63), agricultural education (page 64), agricultural science and management

(page 66), animal science (page 59), entomology (page 60), food science (page 69), international agricultural development (page 65), plant protection (page 61), plant science (page 60).

Biology Programs

Biochemistry (page 71), nutrition (page 72), physiology (page 72).

Resource Science Programs

Atmospheric science (page 75), park and recreation administration (page 76), range management (page 76), renewable natural resources (page 77), soil and water science (page 78), wildlife and fisheries biology (page 79).

Preparatory Programs

Preforestry (page 79), preveterinary medicine (page 81).

If Undecided About Major (see page 83)

Clarification of Fields of Study Offered by the College

The fields of interest that are broadly grouped under the agricultural and environmental sciences differ in nomenclature or major title depending upon institutional organization. The following list is given as a cross-reference to majors offered by the College as an aid to the student:

<i>Fields of Interest</i>	<i>Offered in These Majors in the College</i>
Aboriculture	Plant Science—Environmental Horticulture
Agronomy	Plant Science or Agricultural Science and Management
Animal Husbandry	Animal Science or Agricultural Science and Management
Bee Biology	Entomology
Biological Control	Entomology or Plant Protection
Biology	Entomology, Animal Science, Plant Science, Biochemistry, Nutrition or Physiology
Biometeorology	Atmospheric Sciences
Biophysics	Biochemistry
Brewing Technology	Food Science
City Planning	Park and Recreation Administration
Dairy Husbandry	Animal Science, Agricultural Science and Management
Dairy Technology	Food Science
Enology	Food Science
Fish and Game Management	Wildlife and Fisheries Biology
Floriculture	Plant Science—Environmental Horticulture
Food Technology	Food Science
Genetics—Animal or Plant	Animal Science or Plant Science
Horticulture	Plant Science or Agricultural Science and Management

<i>Fields of Interest</i>	<i>Offered in These Majors in the College</i>
Interior Decoration	Design
Irrigation	Soil and Water Science
Landscape Design	Plant Science—Environmental Horticulture
Landscape Horticulture	Plant Science—Environmental Horticulture
Meat Technology	Food Science
Meteorology	Atmospheric Sciences
Molecular Biology	Biochemistry
Nursery Production	Plant Science—Environmental Horticulture
Ornamental Horticulture	Plant Science—Environmental Horticulture
Park Administration	Park and Recreation Administration
Plant Pathology	Plant Science
Plant Nutrition	Soil and Water Science or Plant Science
Pomology	Plant Science or Agricultural Science and Management
Poultry Husbandry	Animal Science or Agricultural Science and Management
Production	Animal Science or Plant Science
Soils	Soil and Water Science
Truck Crops	Plant Science or Agricultural Science and Management
Turf Management	Plant Science—Environmental Horticulture
Vegetable Crops	Plant Science or Agricultural Science and Management
Viticulture	Plant Science or Agricultural Science and Management
Wine Making	Food Science

For further information or clarification of offerings in the College contact the Dean's Office, College of Agricultural and Environmental Sciences.

FAMILY AND CONSUMER SCIENCE PROGRAMS

Curriculum in Family and Consumer Sciences

Majors: Child Development, Design, Dietetics and Nutrition, Foods, Home Economics, Textile Science.

This curriculum combines broad preparation in natural and social sciences and humanities with studies which emphasize the interests and problems of people in families and as consumers. The major in *Child Development* prepares students for work with children and for further study in such areas as teaching, clinical psychology, research with children, counseling or compensatory education. The *Design* major emphasizes interior design, costume design, and textile design, with supporting courses in drawing, painting, sculpture, graphic design, architecture, and ceramics. The design major may be used preliminary for furthering study in graduate or professional school or as prep-

aration for teaching. The major in *Dietetics and Nutrition* can qualify the student for a one-year postgraduate internship which leads to professional work as a dietitian in institutions and hospitals, or in teaching and research. This major also prepares students for technical work on nutritional properties and formulation of human foods and animal feeds, and for nutrition work in community and governmental agencies. The major in *Foods* emphasizes the chemical and physical properties of foods, and why they behave as they do in processing and preparation for the table. The student is prepared for such careers as technical work in test kitchens, control laboratories in food processing, and for industrial work in food production and marketing. The *Textile Science* major emphasizes study of fibers, yarns and fabrics with an emphasis on end-use properties and performance. The major offers two options, one stresses the sciences and the other combines textile science and design. It prepares students for careers such as technicians in business, industry and research, and in merchandising. General studies over the entire field comprise the *Home Economics* major which leads to an academic major for a secondary teaching credential or for a variety of positions in business or Health and Welfare Agencies. The various majors provide preparation for advanced studies at the graduate level in preparation for careers in research, college teaching or extension work.

Graduate Study. The departments whose teaching programs provide the multi-disciplinary curriculum in Family and Consumer Sciences also participate in graduate study programs leading to advanced degrees in Agricultural Chemistry (Ph.D.), Nutrition (M.S., Ph.D.) and Agricultural Economics (M.S., Ph.D.). The Master of Science degree in Home Economics is offered with specialization in nutrition, textile science, foods, consumer economics, or child development. The Master of Education degree is offered in the family sciences.

Natural Sciences

Chemistry, one course	
Physics, one course	
Statistics or other mathematics, one course	
One course in each of two areas of biological sciences	
Additional courses in the natural sciences to make a total of* 27	

Social Sciences

One course in each of two areas of:	
Psychology, sociology, cultural anthropology	
One course in each of two areas of:	
Economics, political science, history†	
Additional courses in the social sciences to make a total of* 27	

Humanities

English, 8 units	
Design, one course	

* Elective courses may be taken on a pass or not passed basis.

† Units earned in satisfaction of the American History and Institutions requirement may be used in partial satisfaction of the social science and humanities requirement.

Literature, foreign language, or philosophy, one course	
Art, dramatic art, rhetoric, or music, one course	
Additional courses in the humanities to make a total of*	27
<i>Major requirements and electives (see below)</i>	99
Total units required for the Bachelor of Science degree	180

Since many of the courses required for the various majors are in the lower division, the entering student can begin to satisfy both core and major requirements in the first year. Similarly, other courses required for a major contribute to satisfying their corresponding core subject requirements.

The requirements for each of the six majors are as follows:

Child Development Major

Anthropology 2; Biology 1; Genetics 115; Human Development 131, 133, 136, 137, 140, 141, 142; Statistics, one course; Nutrition 10; Physiology, one course; Psychology 1A, 1B, 1C; Sociology 1, 2, 126.

Design Major

Anthropology 2; Art 1A, 1B, 2, 16; Design 6, 120A, 120C, 140A, 140B; one design course from the following: 143, 144; four design courses from the following: 160A, 160B, 160C, 170A, 170B, 170C, 180A, 180B, 180C, 197; Philosophy 123; Psychology 1A; two courses chosen from the following list: Art 12A, 12B, 14A, 14B; three courses in the history of art.

Dietetics and Nutrition Major

Bacteriology 2; Biochemistry 101A, 101B; Biology 1; Chemistry 1A, 1B, 8A, 8B; Economics 1A, 1B; Foods 100A, 100B, 101A, 101B; Mathematics 13; Nutrition 112A, 112B, 113; Physiology with laboratory*; Psychology 1A; plus either group A (dietetics) or group B (nutrition) as follows:

Group A: Economics 11A, 11B; Education 110; Institution Management 121, 122A, 122B; Nutrition 116.

Group B: Biochemistry 101L; Chemistry 1C, 5; Nutrition 117.

Foods Major

Bacteriology 2; Biochemistry 101A, 101B; Biology 1; Chemistry 1A, 1B, 1C, 5, 8A, 8B; Foods 100A, 100B, 101A, 101B, 134A, 134B, 135A, 135B, 197; Food Science and Technology 107A-107B; Mathematics 13; Nutrition 112A, 112B, 113; Physics 2A, 2B, 2C; Physiology 2.

Home Economics Major§

Bacteriology 2; Biology 1; Chemistry 1A, 1B, 8A, 8B; Consumer Economics 142; Design 6; Applied Behavioral Sciences 150; Economics 1A; Foods 100A,

* Elective courses may be taken on a pass or not passed basis.

§ Students planning to meet the secondary teaching credential requirements or to qualify for extension positions should also complete the following: Design 180A; Foods 101A, 101B; Nutrition 113; Home Management 140L; Textiles and Clothing 160L, 172, 370, 375.

100B; Human Development 131, 133, 137; Mathematics 13; Nutrition 112A, 112B; Physiology 2 or Animal Physiology 101; Psychology 1A; Home Management 140; Textiles and Clothing 7, 160.

Textile Science Major

Biology 1; Chemistry 1A, 1B, 8A, 8B; Consumer Economics 141; Economics 1A, 1B; Mathematics 13; Psychology 1A; Textiles and Clothing 7, 160, 160L, 161, 161L, 162, 162L, 172; plus either Group A or Group B as follows:

Group A: Bacteriology 2; Chemistry 1C, 5; Mathematics 15, 16A, 16B; Physics 2A, 2B, 2C.

Group B: Art 2; Design 143, 170A, 170B; Textiles and Clothing 370, 375; two courses in the history of art or design.

AGRICULTURAL SCIENCES PROGRAMS

Curricula are available based upon the natural sciences, such as agricultural bioscience and food science. Others emphasize the social sciences. These include agricultural economics and agricultural business management. The third type of curriculum combines technical training with depth in the social sciences. For example, agricultural science and management and agricultural education and development.

Curriculum in Agricultural Biosciences

Majors: Animal Science, Entomology, Plant Science, Plant Protection

The Agricultural Biosciences curriculum provides a broad training in the physical and biological sciences and in their application to the production and processing of animals and plants for human use. It furnishes a basic background necessary for success in agricultural production and related industries.

The curriculum provides an excellent base for graduate study in such fields as agricultural chemistry, agronomy, animal husbandry, animal physiology, botany, comparative biochemistry, endocrinology, entomology, genetics, horticulture, nutrition, plant pathology, plant physiology, poultry science, soil science, and vegetable crops.

Undergraduates may select one of the four general majors or, within the animal science and plant science majors, they may choose a field of specialization.

Requirements for the major and for the field of specialization are met largely by upper division courses. The student's first two years should, therefore, be devoted chiefly to meeting core requirements, many of which are satisfied by courses in the lower division. The following subjects and units constitute the *core requirements* for the curriculum in Agricultural Biosciences:

Biological sciences (including one animal-oriented and one plant-oriented course)	20
Chemistry (including organic chemistry)	15
English and/or rhetoric	8
Mathematics (including calculus and statistics)	7

Physics	9
Social sciences and humanities electives‡*	28
Unrestricted electives*	24
	—
<i>Major requirements</i> (see below)	69
	—
Total units required for the Bachelor of Science degree	180

The requirements given above allow for considerable flexibility, permitting the student to make certain selections in accordance with his academic preparation and his particular interests. The following program is offered only as a guide:

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Chemistry 1A, 1B	5	5	—
Biology 1	—	—	6
English 1, 2, 3, 4A, 4B, or 5; Rhetoric 1A, or 1B....	4	4	—
Animal Science 1 and Plant Science 1	3	3	—
Electives†	3	3	9
	—	—	—
	15	15	15
<i>Sophomore Year</i>			
Bacteriology 2 or Botany 2	—	5	—
Chemistry 8A, 8B	3	3	—
Physics 2A, 2B, 2C	3	3	3
Mathematics 13, 16A	4	3	—
Electives†	5	1	12
	—	—	—
	15	15	15

Animal Science Major Requirements

This major centers on the basic science disciplines of nutrition, physiology, and genetics as they apply to animal and poultry production. A concentrated study program may be arranged in the following fields of specialization: *animal science, genetics, nutrition, physiology, and poultry husbandry*. Students should consult the department for specific information concerning the specialization.

6

Subject and unit requirements are:

Biochemistry	6
Genetics	5
Nutrition	5
Physiology	6
Laboratory units in biochemistry, genetics, nutrition, or physiology.....	4

* Elective courses may be taken on a pass or not passed basis.

† Units earned in satisfaction of the American History and Institution requirement may be used in partial satisfaction of the social science and humanities requirement.

‡ Elective courses may be used to satisfy in part electives specified in the core or major requirements.

Specialized courses in animal sciences	18
Electives approved by adviser	25
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69

A course in bacteriology (Bacteriology 2) and Animal Science 1 and 2 are recommended; these courses partially satisfy the biological sciences core requirement.

Students may also pursue a program in animal science under the Agricultural Science and Management curriculum described on page 66.

Entomology Major Requirements

This major provides an introduction to the many branches of entomology, such as the role of insects in the transmission of plant and animal diseases; control of insects with natural enemies and chemicals; bee biology; and a study of the insects themselves, their behavior, classification, and intricate structure. Graduates are eligible to work in many commercial fields and in local, state, and federal agencies. The course work also provides a basis for graduate studies.

Subject and unit requirements are:

Bacteriology	5
Botany or zoology (in addition to core requirements)	12
Genetics	5
Plant physiology, plant pathology, or biochemistry	4
Introduction to entomology (Entomology 1)	5
Structure and function of insects (Entomology 101)	4
Insect physiology (Entomology 102)	4
Systematic entomology (Entomology 103)	4
Insect ecology (Entomology 104)	4
Field taxonomy and ecology (Entomology 109)	5
Electives approved by adviser	17
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69

Plant Science Major Requirements

Opportunities for concentrated study in areas of plant science include the following fields of specialization: *agronomy, floriculture, landscape horticulture, nursery management, plant pathology, pomology, vegetable crops, and viticulture*. Students should consult the department for specific information concerning the specialization.

Subject and unit requirements are:

Entomology	4
Genetics	3
Nematology or weed science	2
Plant pathology	4
Plant physiology	5

Soil and water science	6
Electives approved by adviser:	
a) Biochemistry, botany, chemistry, genetics, geography, geology, mathematics, microbiology, physics, or zoology	6
b) Entomology, nematology, plant nutrition, plant pathology, plant science, soils, water science, or weed science	9
c) Courses to complete major	28
	—
	69

Plant Science 1 and 2 are recommended; these courses partially satisfy the biological sciences core requirements.

Students may also pursue a program in Plant Science under the Agricultural Science and Management curriculum described on page 66.

Plant Protection Major Requirements

This major is for students interested primarily in control of agricultural pests, whether insects, nematodes, plant diseases, vertebrates, or weeds. Career opportunities are available in technical sales and service with chemical companies, food-processing firms, Farm Advisers' Offices, and growers' organizations. Students who are eligible may benefit by one or more years of graduate study in entomology, plant pathology, or plant physiology (weed science).

Subject and unit requirements are:

Agricultural Engineering (chemical application)	3
Agricultural toxicology	3
Animal science (wildlife in land use)	4
Botany (physiology and weed science)	12
Entomology	12
Nematology	8
Plant pathology	12
Electives approved by adviser	15
	—
	69

(The Plant Protection major needs 3 units of economics to fulfill the requirement. These units may be used to satisfy in part the social science and humanities requirement.)

Curriculum in Agricultural Economics and Business Management

Majors: Agricultural Economics, Agricultural Business Management

This curriculum is concerned with the economics of the agricultural industry. Its basic goal is to improve the student's knowledge of economic forces and the environment in which agricultural production and distribution take place. The programs offered enable students to develop a specialization in resource economics, management, marketing, and policy.

The requirements for the major are met largely by upper division courses.

The student should, therefore, devote his first two years chiefly to meeting core requirements. The following subjects and units constitute the *core requirements* for this curriculum:

Accounting	6
Agriculture other than agricultural economics*	18
Chemistry and physics	9
Economics	9
English	4
English or rhetoric	4
Mathematics (discrete, analytical geometry, and calculus)	6
Natural science electives*	17
Statistical methods	4
Social sciences and humanities electives approved by adviser†	19
Unrestricted electives*	24
<hr/>	
<i>Major requirements</i> (see below)	60
<hr/>	
Total units required for the Bachelor of Science degree	180

The requirements given above allow for considerable flexibility, permitting the student to make certain selections in accordance with his academic preparation and his particular interests. The following two-year program is offered only as a guide:

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
English 1 or 2, or Rhetoric 1A or 1B	4	4	—
Physics 10	4	—	—
Chemistry 1A	—	5	—
Biology 10 (natural science elective)	—	—	4
Political Science 1A, 1B (social science elective)	4	—	4
Plant Science 1, 2 (agriculture electives)	—	3	3
Electives†	3	3	4
<hr/>		<hr/>	<hr/>
	15	15	15
<i>Sophomore Year</i>			
Economics 1A, 1B	5	5	—
Mathematics 15, 16A or equivalent	3	3	—
Economics 11A, 11B	4	3	—
Agriculture electives	3	4	3
Electives†	—	—	12
<hr/>		<hr/>	<hr/>
	15	15	15

* Elective courses may be taken on a passed or not passed basis.

† Units earned in satisfaction of the American History and Institution requirement may be used in partial satisfaction of the social science and humanities requirement.

‡ Elective courses may be used to satisfy in part electives specified in the core or major requirements.

Agricultural Economics Major Requirements

This major considers the economics of agricultural production, marketing, use of resources, prices, and policy. It permits the student a choice of specialization best adapted to his plans.

Subject and unit requirements are:

Agricultural Economics 100A, 100B, 100C, 106A, 106B.....	15
Agricultural economics electives	15
Macro-economic theory upper division	3
Agricultural Economics 190A*-190B (senior research project in major field)	4
Electives approved by adviser*	23
	—
	60

Agricultural Business Management Major Requirements

This major provides training in the managerial aspects of agricultural business. It emphasizes the decision-making function of management, the use of management controls, personnel policies, and procurement and marketing methods.

Subject and unit requirements are:

Agricultural Economics 18, 100A, 100B, 100C, 106A, 106B, 112, 116, 117..	30
Agricultural Economics 190A*-190B (senior research project in major field)	4
Electives approved by adviser	26
	—
	60

Curriculum in Agricultural Education and Development

Majors: Agricultural Education, International Agricultural Development

This program combines training in agricultural and related biological and physical sciences with a solid liberal arts education.

Students in these majors satisfy the requirements largely by upper division courses. The student therefore, should devote his first two years chiefly to meeting *core requirements*. These are as follows:

Agricultural science (introductory)	3
Biological sciences (including genetics)	21
Chemistry (including organic)	15
Economics	5
English	8
Mathematics (statistics)	4
Physics	6
Social sciences and humanities electives†*	15

* May be taken on a pass or not passed basis.

† Units earned in satisfaction of the American History and Institution requirement may be used in partial satisfaction of the social science and humanities requirement.

Unrestricted electives*	24
<i>Major requirements</i> (see below)	79
Total units required for the Bachelor of Science degree	180

The requirements given above provide considerable flexibility, allowing the student to make certain selections in accordance with his academic preparation and particular interests. The following two-year program is only a guide:

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
English 1, 2, 3, 4A, 4B, or 5	4	4	-
Chemistry 1A, 1B	-	5	5
Agricultural science (introductory)	3	-	-
Mathematics 13	-	4	-
Electives†	8	2	10
	—	—	—
	15	15	15
<i>Sophomore Year</i>			
Economics 1A	-	5	-
Chemistry 8A, 8B	3	3	-
Physics 2A, 2B	-	3	3
Biology 1	6	-	-
Electives†	6	4	12
	—	—	—
	15	15	15

Agricultural Education Major Requirements

This curriculum should be particularly useful to students considering careers in agricultural teaching, production, or service, or in foreign service activities in educational, commercial or technical fields. Its breadth also provides excellent preparation for advanced study in several areas of the agricultural sciences.

The following subjects and units constitute the requirements for the major:

Agricultural Education 160 or 187, 320A	4
Agricultural economics	9
Agricultural engineering	11
Animal science	16
Plant and soil science	16
Social sciences and humanities‡*	8

* Elective courses may be taken on a passed or not passed basis.

† Elective courses may be used to satisfy in part electives specified in the core or major requirements.

‡ Units earned in satisfaction of the American History and Institution requirement may be used in partial satisfaction of the social science and humanities requirement.

Electives approved by adviser (from the following: Nutrition 103, Entomology 110, Plant Pathology 120, Soil and Water Science 1, Water Science 110A, 110B)	15
	— 79

Curricula for Teacher Education

Students may make appointments with credential counselors and obtain a statement of the complete requirements for the credential at the departmental office.

Required courses for professional preparation include: Education 110, 120; Agricultural Education 160, 320B, 320C, 320E; and 9 quarter units of subject-matter courses.

International Agricultural Development Major Requirements

Graduates in International Agricultural Development may enter the Foreign Agricultural Service or other governmental agencies with overseas activities via civil service examinations, or join commercial firms with foreign branches or departments. The Peace Corps, the International Voluntary Services, and similar organizations continually seek recruits with such training for two-year, or similarly brief, assignments. Experience in these positions often leads to career opportunities in technical assistance and development with governmental agencies, foundations, and private agencies. Graduates in this major also find employment in cooperatives, chambers of commerce, and other United States employers concerned with public relations. A B.S. degree in this major is an excellent foundation for graduate training leading to a M.S. in International Agricultural Development or the Ph.D. in Agricultural Economics with International Agricultural Development as an elective field. Such advanced training is essential for many professional careers in overseas development or technical assistance.

The student will partially satisfy the social sciences and humanities core requirements in the upper division. He must select three courses from the following: History 174A, 174B, 176A, 176B, 178A, 178B, 179A, 179B, and 180; Political Science 102, 105, 113, 128A, 163, and 166.

Basic requirements, subjects and units, for the major are:

International Agricultural Development 101 or 102, 190	6
Economics or agricultural economics	6
Foreign language†, humanities, and social sciences (anthropology or sociology, geography and/or psychology)	32
Primary field of specialization: animal science or plant science	14
Secondary field of specialization: agricultural economics, agricultural engineering, animal science, plant science, or soil and water science (at least 8 units upper division)	12
Agricultural and other science electives approved by adviser (to be selected)	

† The language requirement is proficiency in a single foreign language equivalent to passing course 4.

from agricultural engineering, animal physiology, bacteriology, biochemistry, entomology, nutrition, plant pathology, soil science, water science, and weed science)	9
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Curriculum in Agricultural Science and Management

Major: Agricultural Science and Management

This program is designed for students interested in management positions in farming, ranching or agriculturally oriented industries. The curriculum combines training in the scientific principles involved in modern agriculture and management techniques.

The program includes a preparatory core in the biological, physical, and social sciences, the humanities, and a broad introduction to agriculture. These are normally completed during the first three collegiate years. To complete the B.S. degree, courses in Agricultural Economics are required plus those from an area of specialization (Animal Science, Food Technology or Plant Science). For those who wish to extend their preparation, a M.S. program is available. This requires the equivalent of the B.S. program plus at least an additional year combining "Economics of Agricultural Management" and the field of specialization.

Requirements for this curriculum are:

Agricultural science (at least one course in animal science, food science, plant science, soil and water science)	20
Biological sciences	16
Chemistry (including organic)	15
Economics	10
English or rhetoric	8
Mathematics (statistics, calculus, and discrete mathematics recommended) ..	10
Physics	9
Social sciences and humanities electives†*	18
Unrestricted electives*	24
<hr/>	
<i>Major requirements (see below)</i>	<i>50</i>
<hr/>	
Total units required for the Bachelor of Science degree	180

The requirements given above allow for considerable flexibility, enabling the student to make certain selections in accordance with his academic preparation and his particular interests. The following two-year program is offered only as a guide:

* Elective courses may be taken on a passed or not passed basis.

† Units earned in satisfaction of the American History and Institution requirement may be used in partial satisfaction of the social science and humanities requirement.

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
English 1, 2, 3, 4A, 4B, 5, Rhetoric 1A, or 1B	4	4	-
Chemistry 1A, 1B	5	5	-
Animal Science 1, 2	3	-	3
Plant Science 1, 2	-	3	3
Biology 1	-	-	6
Mathematics 16A, 16B	-	3	3
Electives†	3	-	-
	—	—	—
	15	15	15

<i>Sophomore Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Chemistry 8A, 8B	3	3	-
Economics 1A, 1B	5	5	-
Soil and Water Science 1, 2	3	3	-
Agricultural Economics 1, 2	-	3	3
Bacteriology 2, or Botany 2	-	-	5
Physics 2A, 2B, 2C	3	3	3
Mathematics 13	-	-	4
	—	—	—
	14	17	15

Major Requirements for the Bachelor of Science Degree

Major requirements include:

Agricultural economics (economics of agricultural management).....	15
Animal science, food technology, or plant science specialization.....	18
Electives approved by adviser	17
	—
	50
	—

Total units required for the Bachelor of Science degree 180

Certain courses are required. All students must complete the requirements in Economics of Agricultural Management and one other specialization.

Economics of Agricultural Management

Agricultural Economics: recommended for the Bachelor of Science program, course 100A and two chosen from 112, 114, 116, 117, and 140; recommended for students who may take the program leading to the M.S. degree, courses 100A–100B, 106A–106B, and Economics 1A–1B, 11A–11B.

Animal Science

Animal Genetics 107, and 107A, 107B, 107C, or 107D; Animal Nutrition 103 or 110†; Animal Science 114A–114B†, 116A–116B†, 118, or any two from

† Elective courses may be used to satisfy in part electives specified in the core or major requirements.

Animal Science 10‡, 11‡, 12, or 149‡; 5 units animal science electives. The indicated (‡) courses are recommended for students who may change to the program leading to the M.S. degree.

(Students may also pursue a program in the animal sciences under the Agricultural Biosciences curriculum described on page 58.)

Food Technology

Bacteriology 2; Biochemistry 101A-101B; food science, 18 units including Food Science and Technology 100, 101, 104A-104B, and a food-processing course. Recommended: Chemistry 5.

Plant Science

Biology 1; Botany 2, 111; Plant Science 2, 101, 102; Soil and Water Science 1, 2; 12 units related to agronomy, floriculture, landscape horticulture, park administration, plant pathology, pomology, vegetable crops, or viticulture; 8 units from Entomology 110, Genetics 100A-100B, Plant Pathology 120, Nematology 110, or Plant Science 120.

(Students may also pursue a program in the plant sciences under the Agricultural Biosciences curriculum described on page 58.)

Program Leading to the Master of Science Degree

1. Completion of the Bachelor of Science program or its equivalent.

2. Complete the Graduate Division requirements of one year of graduate residence and 36 units, including 21 units of graduate credit, in addition to the requirements for a Bachelor of Science degree.

a. Graduate units (200 series)

Seminar	3
Agricultural economics (economics of agricultural management)	6
Animal science, food technology, plant science, or resource science.....	6
Additional graduate work in agricultural economics or the specialization ...	6
.....	—
	21
b. Electives approved by adviser (upper division or graduate)	15
.....	—
	36

3. A comprehensive oral examination in agricultural economics and the field of specialization

Total units required for the Master of Science degree

All students must complete the requirements in Economics of Agricultural Management and one other specialization. Certain courses are required and may have been satisfied while in undergraduate standing or must be included as part of the graduate program:

Economics of Agricultural Management

Agricultural Economics including 100A-100B, 106A-106B, 3 units from

155, 160, 170, 176, and Economics 1B, 11B. The 6 graduate units must be selected from Agricultural Economics 250, 253A-253B, 257, and 260.

Animal Science

Biochemistry, 6 units; physiology (excluding 101, 101L), 6 units.

The indicated (‡) courses listed under the Bachelor of Science program (see page 67) are recommended.

Food Technology

Program of courses to be developed in consultation with the adviser.

Plant Science

Entomology 110; Genetics 100A-100B; Plant Pathology 120; and Nematology 110 or Plant Science 120.

Resource Technology

Soil Science 105, 120B; Water Science and Engineering 110B; a course in climatology.

Recommended: Geography 161; Political Science 181.

Curriculum in Food Science

Major: Food Science

Food science is the key to converting animal and plant products into a wide variety of processed and preserved foods. It applies physical and biological sciences in solving fundamental problems leading to technological advances in the processing of foods.

The chemical, microbial, and engineering aspects of food processing are emphasized in this program. The curriculum is sufficiently flexible to satisfy a student's individual interests and needs in specialized areas. Such specializations include *brewing technology, dairy technology, enology, fruit and vegetable technology, and the technology of meat and poultry processing*.

Graduates qualify for supervisory, technical, sales, and executive positions in the food and allied industries. Students who pursue graduate work in food science find additional opportunities, such as research and teaching positions in universities or research in governmental and industrial organizations.

The requirements for the major are met largely by upper division courses. The student should, therefore, devote his first two years chiefly to meeting core requirements. The following subjects and units constitute the core requirements for the food science major:

Bacteriology	5
Biochemistry	9
Biology	6
Chemistry (including physical)	29
English and/or rhetoric	8
Mathematics (including calculus and statistics)	13
Physics	12

Social sciences and humanities electives†*	28
Unrestricted electives*	24
<i>Major requirements (see below)</i>	46
Total units required for the Bachelor of Science degree	180

The requirements given above allow for considerable flexibility, permitting the student to make certain selections in accordance with his academic preparation and his particular interests. The following two-year program is offered as a guide:

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Biology 1	-	-	6
Chemistry 1A, 1B, 1C	5	5	5
English 1, 2, 3, 4A, 4B, 5, Rhetoric 1A, or 1B.....	4	4	-
Food Science 1	3	-	-
Mathematics 13	-	-	4
Electives†	3	6	-
	—	—	—
	15	15	15
<i>Sophomore Year</i>			
Bacteriology 2	-	5	-
Chemistry 5	-	-	4
Chemistry 8A, 8B	3	3	-
Mathematics 16A, 16B, 16C	3	3	3
Physics 2A, 2B, 2C	3	3	3
Physics 3A, 3B, 3C	1	1	1
Electives†	5	-	4
	—	—	—
	15	15	15

Food Science Major Requirements

Introduction to food science (Food Science 1)	3
Food chemistry (Food Science 101, 103)	8
Food engineering (Food Science 110A, 110B, 110C).....	9
Food microbiology (Food Science 104A, 104B, 105A, 105B)	8
Electives approved by adviser	18
	—
	46

(A food technology specialization is available to interested students under the Agricultural Science and Management curriculum described on page 68.)

* Elective courses may be taken on a pass or not passed basis.

† Units earned in satisfaction of the American History and Institution requirement may be used in partial satisfaction of the social science and humanities requirement.

‡ Elective courses may be used to satisfy in part electives specified in the core or major requirements.

BIOLOGY PROGRAMS

Curriculum in Quantitative Biology

Majors: Biochemistry, Nutrition, Physiology.

The quantitative biology curriculum is designed primarily for students who plan to pursue study in biochemistry, nutrition, or physiology. By providing intensive basic training in biology, chemistry, physics, and mathematics, it will also thoroughly prepare students for advanced or professional study in these or other fields of quantitative biology such as biophysics or molecular biology, or in medicine.

Employment opportunities are available in government and industry programs of institutional research and teaching, and, following advanced preparation, in medical and academic institutions.

Requirements for the major are largely met by upper division courses. The students' first two years should, therefore, be devoted chiefly to meeting core requirements, many of which are satisfied by courses in the lower division. The early phases of study in the three majors are sufficiently similar to allow students to enter the curriculum and decide on a major after the first year if they wish.

The following subjects and units constitute the *core requirements* for the curriculum:

Biology	21
Preparation: Biology 1; one additional course chosen from Bacteriology 2, Botany 2, Zoology 2, or Physiology 101 and 101L.	
Upper Division Biology Core: at least one upper division course from two areas, other than the major subject: biochemistry, genetics, nutrition, physiology.	
Chemistry	25
English and/or rhetoric	8
Mathematics (including one year of calculus)	12
Physics (any courses, except Physics 10, and including at least one laboratory course)	12
Social science and humanities†*	28
Unrestricted electives*	24
Major requirements (see below)	50
 Total units required for the Bachelor of Science degree	 180

6

The requirements for each of the three majors are as follows:

Biochemistry

The science of biochemistry considers the quantitative, organic, and physical chemical aspects of living systems as these relate to the broad areas of zoology, botany, microbiology, and chemistry.

* Elective courses may be taken on a pass or not passed basis.

† Units earned in satisfaction of the American History and Institution requirement may be used in partial satisfaction of the social science and humanities requirement.

Core requirements must be met in part by Genetics 100A–100B, at least 3 units of physics laboratory.

The major requirements are satisfied by:

Biochemistry 101A, 101B, 101L	10
Additional biochemistry or closely related courses (Biochemistry 108 and 190 are strongly recommended)	16
Chemistry 110A, 110B, 110C, 112C	14
Electives approved by the adviser	10
	—
	50

(Students in Biochemistry must have a reading knowledge of one of the following: French, German, Japanese, or Russian, normally equivalent to course 5. Units may be used to partially satisfy the social science and humanities requirement.)

Nutrition

This science is the study of the components of food which are basic to life and health. The biochemical and physiological aspects of these factors in the animal body are of primary interest.

Core requirements must be met in part by Bacteriology 2, English 1, Physiology 101, 101L, and an upper division course in genetics.

The major requirements are satisfied by:

Biochemistry 101A, 101B, 101L (or Animal Biochemistry 102)	9
Nutrition 110	5
Additional nutrition or closely related courses	20
Physiology 110A, 110B, 111A, 111B	8
Electives approved by the adviser	8
	—
	50

Physiology

Physiology is concerned with the vital functions of living things which include a systematic study of the functional properties of tissues and organs, and comparisons of processes among different kinds of animals.

The core requirements must include upper division courses in both genetics and nutrition, and Physiology 101, 101L.

The major requirements are satisfied by:

Biochemistry 101A, 101B and laboratory (preferably Animal Biochemistry 102)	10
Physiology 100A, 100B, 100L, 110A, 110B, 111A, 111B	15
Additional physiology courses	10
Electives approved by the adviser	15
	—
	50

RESOURCE SCIENCES PROGRAM

Curriculum in Resource Sciences

Majors: Atmospheric Science, Park and Recreation Administration, Range Management, Renewable Natural Resources, Soil and Water Science, Wildlife and Fisheries Biology, and Pre-forestry.

This new curriculum emphasizes education in the development and management of our renewable natural resources that can be maintained or improved but are threatened by the sheer numbers of the exploding population of the world. These resources include the climate, air, water, land, vegetation, and animals. These parts of man's environment are of economic and aesthetic value and are vital to man's continued existence. A prime concern of modern society, then, is their management, protection, and development.

Vital questions that must be answered in the near future are: Will the climate, air, water, land, vegetation, and animals be adequate to our growing needs for food, feed, and fiber, as well as for recreation and a desirable environment? Can we halt and reverse the increasing contamination and pollution of air, land, and water? How will man replace the large areas of valuable agricultural land that are lost to urban and industrial developments each year? Can we save irreplaceable fisheries and wildlife, and provide a sufficiency of the outdoor recreation areas so vital to the well-being of an expanding, active population?

The need is obvious for integrated development and enlightened management of our natural resources.

Graduates in resource sciences can play an important part in finding solutions to the problems in this challenging area. The challenge is especially great in California, with eighty-six million acres of forest, range, and wildlands, thirteen million acres of agricultural lands, including nine million under irrigation, two hundred and twenty-seven state and national parks, nearly four thousand lakes, and thirty thousand miles of fishable streams.

The field embraces an unusually broad spectrum of rewarding employment opportunities. Graduates in Resource Sciences, depending upon the major they select, qualify for professional employment with federal, state, local agencies and private industries as biologists, conservationists, ecologists, hydrologists, meteorologists, soil scientists, naturalists, or experts on park and recreation programs. Studies under this curriculum can be excellent preparation for graduate work for those seeking careers in teaching, administration, or research.

The applied aspects of the curriculum will be of particular interest to students who respond to the challenges in practical problems of air and water pollution, the management of resources for the benefit of society, and the development of adequate recreation facilities for a growing population. Those who are more intrigued by the processes and interactions by which the various physical and biological systems operate will find ample scope for their curiosity in the basic studies available in this curriculum. In either case, the integrated program combines the biological, physical, and social sciences to give the stu-

dent an appreciation of the cultural, economic, and scientific aspects of the world's resources.

All six majors under the curriculum have the same set of "core courses." Students should devote the first two years largely to satisfying these core requirements; immediate selection of a major is not essential. This feature facilitates transfer from Junior Colleges or other institutions. In the upper division the courses are oriented more directly to the particular major selected. Students planning to transfer to the School of Forestry and Conservation at Berkeley will be associated with the Resource Sciences group while on the Davis campus.

The opportunity for study of all aspects of the Resource Sciences is especially good at Davis because of its proximity to major lakes, forest, stream, delta, and wildlife areas, and its central location in California's nine million acres of irrigated agricultural land.

Subject Requirements. All majors in the curriculum use the same *core* of subjects which includes a unique balance between the physical, biological, and social sciences and humanities. This feature is especially advantageous for students who have a general area of interest but who are undecided about a major field of specialization. Students planning partial completion of requirements in other colleges will benefit from observing the *core* subject recommendations. These *core* subject and unit requirements include:

Biological sciences	11
Biology	6
Botany	5
Physical sciences	33
Physics and chemistry	24
Mathematics	9
Social sciences and humanities	36
English and/or rhetoric	8
Upper division social sciences in at least two of the following: economics, geography, political science*	12
Electives approved by adviser*	16
Renewable natural resources	6
Unrestricted electives*	24
Major Requirements (including 40 units of specific courses, and 30 units of electives. See following pages.).....	70
Total units required for the Bachelor of Science degree.....	180

The student majoring in one of the Resource Sciences will find significant background in introductory courses offered under Agricultural Science and Management. Since the resource science majors vary slightly in specific requirements, the following two-year introductory program is presented only as a general guide and the major should be used for further guidance.

* Elective courses may be taken on a pass or not passed basis.

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Chemistry 1A, 1B	5	5	-
English 1, 2, 3, 4A, 4B, 5, Rhetoric 1A or 1B	4	4	-
Biology 1	-	-	6
Mathematics 13, 15, 16A, 16B, or 16C	3	3	3
Plant Science 1	-	3	-
Specific courses and electives†	3	-	6
	—	—	—
	15	15	15

<i>Sophomore Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Physics 2A, 2B, 2C	3	3	3
Botany 2	5	-	-
Soil and Water Science 1, 2.	3	3	-
Chemistry 5 or 8	-		4-5
Specific courses and electives†	4	9	8
	—	—	—
	15	15	15-16

Atmospheric Science Major Requirements

The program for the major in Atmospheric Science comprises studies of the basic meteorological elements, including atmospheric circulation and weather systems, mass and energy transfers between atmosphere and surface and within the atmosphere, radiation, turbulence, diffusion, and precipitation mechanisms, and developments in meteorological instrumentation. Particular emphasis is placed on the role of the atmosphere in the larger context of the physical and biological environment. Graduates can make contributions in fundamental investigations of the atmospheres of the Earth and other planets, as well as in the national weather service, in research on and administration of natural resources, in agricultural and industrial meteorology, and numerous other fields in which the science of the atmosphere plays a major part.

The following subjects and units constitute the requirements for the major and courses used to satisfy them are subject to approval by adviser.

Physical sciences §	17
Mathematics	15
Physics	2
Atmospheric science courses approved by adviser	31
Thermodynamics and Statics of the Atmosphere (Atmospheric Science 120)	3
Dynamics of the Atmosphere (Atmospheric Science 121)	3
Micrometeorology (Atmospheric Science 123)	4
Weather Analysis and Forecasting (Atmospheric Science XXX A, B, C)	9

† Elective courses may be used to satisfy in part electives specified in the core or major requirements.

§ For this major Mathematics 21A, 21B, 21C, 22A, 22B, 22C, and Physics 4A, 4B, 4C, 4D are recommended.

Meteorological Instruments and Observations (Atmospheric Science 124)	3
Electives in atmospheric science	2
Electives*	8
Biological sciences electives*	14
Electives*	8

Park and Recreation Administration Major Requirements 72

In this major, training in the biological, physical, and social sciences is focused on the problems of planning, developing, and managing man's natural environment for his use, enjoyment, and well-being. The range of opportunities is wide—in public and private agencies responsible for parks, recreation, and other landscape developments.

The following subjects and units constitute the requirements for the major and courses used to satisfy them are subject to approval by adviser.

Biological sciences	14
Introduction to Ornamental Plants (Environmental Horticulture 5, 6, 7)	6
Advanced Landscape Horticulture (Environmental Horticulture 128A, 128B)	4
Electives*	4
Physical sciences	9
Geology	3
Soil and water science	6
Biological and physical science electives*	17
Additional requirements	30
Introduction to Landscape Design (Environmental Horticulture 1, 1L)	5
Introduction to City Planning (Park Administration 110)	4
Park and Recreational Area Planning (Park Administration 134)	4
Park Administration (Park Administration 140)	3
Outdoor Recreation (Physical Education XXX)	4
Conservation of Natural Resources (Geography 161)	4
Electives*	6

Range Management Major Requirements 70**

Emphasis on the principles of biological, physical, and social sciences and humanities prepare students for careers in state and federal agencies, as farm advisors, and as managers of commercial organizations. The major also provides a basis for graduate studies in the biological sciences. In the undergraduate major the emphasis is on the sciences needed in sound management and development of public and private lands used primarily for grazing—animal science, plant science, soil and water science, social science, and the humanities.

* Elective courses may be taken on a pass or not passed basis.

** Economics 1A, Sociology 1, and Outdoor Recreation (Physical Education XXX) are required in this major.

Graduates find careers as exemplified by the following former students. One is now a Plant Materials Specialist with the Soil Conservation Service; he has the challenging task of improving habitat and food supplies for wild fowl. Another is a specialist in a Land-Grant College, working on techniques of seedling establishment and weed control for livestock ranges. A third, who earned his Ph.D. in Botany (Ecology), is now a Research Officer in Australia doing research on the ecology of tropical grasslands.

The following subjects and units constitute the requirements for the major and courses used to satisfy them are subject to approval by adviser:

Biological sciences	25
Botany	10
Ecology	3
Genetics	3
Zoology	9
Physical sciences	9
Geology	3
Soil and water science	6
Additional requirements	33
Plant science	3
Agronomy	4
Animal science	12
Range management	14
Electives*	3
	—
	70

Renewable Natural Resources Major Requirements

This major includes the areas of renewable natural resources that are vital to man's environment—the climate, air, water, land, vegetation, and animals. The emphasis is on an integrated approach to their development, management, and protection. Such an approach provides exciting opportunities in considering the problems of providing adequate recreational facilities, protecting renewable natural resources, eliminating pollution of air, water, and soil, planning wise land and water utilization and considering sociological and economic aspects of renewable natural resources. This wide array of problems requires a broad base of knowledge which is provided by this major.

6

Graduates from this program are prepared for technical and managerial positions dealing with the development, use, and conservation of renewable natural resources, and for graduate work in the technical specialties of resource sciences.

The following subjects and units constitute the requirements for the major and courses used to satisfy them are subject to approval by adviser:

Biological sciences	14
Plant science	6
Animal science	6
Electives*	2

* Elective courses may be taken on a pass or not passed basis.

Physical sciences	9
Soil and water science	6
Geology	3
Biological and physical science electives*	17
Agricultural economics	3
One upper division course from each of four departments or groups from the following: Agricultural Economics, Agricultural Engineering, Animal Science, Atmospheric Science, Environmental Horticulture, Geography, Park Administration, Plant Science, Range Management, Soil Science, Water Science, Wildlife and Fisheries Biology, and Zoology.....	15
Electives*	12
	—
	70

Soil and Water Science Major Requirements

The development and use of soil and water resources are critical in the welfare of nations. Man's needs not only for food, fiber and timber but for a livable environment are dependent upon proper management of these vital but limited resources. As population pressures increase, even more people will be needed who are qualified to deal with the complex problems which must be solved.

Excellent employment opportunities are available for graduates of this major in managerial and technical positions with agribusinesses and associated enterprises such as equipment and supply companies, and in private, state, and federal agencies and international organizations dealing with soil and water development, use, and conservation. Qualified students who choose to pursue graduate study will find this program provides excellent preparation.

The following subjects and units constitute the requirements for the major and courses used to satisfy them are subject to approval by adviser:

Biological sciences	14
Plant science	3
Soil-Water-Plant Relationships (Soil and Water Science 104)....	4
Electives*	7
Physical sciences	40
Chemistry and physics	7
Geology and physical geography	4
Introductory Soil and Water Science	6
Physics of Soil and Water Systems (Soil and Water Science 101)..	5
Soil and Water Chemistry (Soil and Water Science 102).....	5
Water Quality, Salt Control, and Reclamation (Soil and Water Science 103)	4
Soil and Water Science electives*	9
Electives*	16
	—
	70**

* Elective courses may be taken on a pass or not passed basis.

** Economics—5 units, Chemistry 5, and Physics 3C are required for this major.

Wildlife and Fisheries Biology Major Requirements

Wildlife provides recreation in the form of hunting and fishing, wearing apparel from fur and feathers, an essentially undeveloped source of nutrition from marine and freshwater products, and a source of solitude and contentment which comes from living with and observing life in the wilds. Not only are certain species of wildlife threatened which cannot adapt to man's activities, but other species have so thrived from man's alterations of the environment that their numbers interfere with the constantly expanding needs of humanity. It becomes imperative for future generations that we maintain a reasonable balance between the needs of man and wildlife.

The major in Wildlife and Fisheries Biology is designed to prepare students for careers in the management of public and private wildlife areas and fisheries. Emphasis is placed upon development of a balanced program in the social, biological, and physical sciences, and maintenance of flexibility in the selection and development of areas of specialization such as ecology, fisheries, or wildlife management. Graduate programs are available for those interested in teaching or research.

The following subjects and units constitute the requirements for the major and courses used to satisfy them are subject to approval by adviser:

Biological sciences	46
Genetics	3
Biology (lower division)	5
Nutrition	4
Pathology	3
Physiology	6
Physiological chemistry	3
Plant taxonomy	4
Vertebrate ecology	3
Wildlife management	9
Zoology	6
Physical sciences	9
General Chemistry (Chemistry 1C)	5
Mathematics	1
Surveying	3
Humanities and social sciences	
Wildlife law**	
Electives*	15
	—
	70

6

Mathematics 13, 16A, 16B or 30 are recommended for this major.

PREFORESTRY

Undergraduate students are admitted to the School of Forestry and Conservation, located on the Berkeley campus, following completion of the sophomore

* Elective courses may be taken on a pass or not passed basis.

** Satisfies two units of the electives in social science and humanities in the core.

year. The preparatory programs offered at Davis provide full preparation for admission to the School. To qualify for such admission, a student must complete at least 84 quarter units of credit with a grade point average of C or higher. In addition, he must satisfy the preparatory subject matter requirements for one of the two majors offered.

General Forestry. The requirements of the preparatory program may be satisfied in full by completion of the following courses offered at Davis, which are listed in the form of a suggested two-year program:

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Chemistry 1A, 1B	5	5	-
English 1, 2, 3, 4A, 4B, 5, Rhetoric 1A or 1B	4	4	-
Physics 2A, 2B, 2C	3	3	3
Electives	3	3	12
	—	—	—
	15	15	15
<i>Sophomore Year</i>			
Biology 1	-	6	-
Botany 2	-	-	5
Economics 1A-1B	5	5	-
Engineering 1	-	-	3
Geology 1	3	-	-
Mathematics 16A, 16B, 13	3	3	4
Electives†	4	-	4
	—	—	—
	15	15	16

Upon completion of this preparatory program, the student majoring in general forestry should enroll in the summer program, Forestry 100A-100B-100C-100D, which is offered through the Berkeley Campus at a field location in Plumas County. This summer field program must be completed before beginning the Fall term of the junior year at Berkeley.

Wood Science and Technology. The requirements of the preparatory program may be satisfied in full by completion of the following courses offered at Davis. They are listed in the form of a suggested two-year program:

<i>Freshman Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Chemistry 1A, 1B, 1C	5	5	5
Mathematics 21A, 21B, 21C	4	4	4
Physics 4A, 4B	-	4	4
Humanities and Social Science§	4	4	-
Electives †	-	-	1
	—	—	—
	13	17	14

† Elective courses may be used to satisfy in part electives specified in the core or major requirements.

§ A minimum of 15 units selected by the students from the following courses including at least two courses from one of the departments: Anthropology 1, 2, 3; Art 1A, 1B, 1C, 1D; English; History 17A-17B; Philosophy 6, 12; Psychology 1A, 33.

<i>Sophomore Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Chemistry 8, 9	5	3	-
Mathematics 22A, 22B, 22C	4	4	4
Physics 4C, 4D, 4E	4	4	4
Biology 1	-	-	6
Humanities and Social Science	4	4	-
	—	—	—
	17	15	14

For full details on the majors in general forestry and in wood science and technology, please consult the *Announcement of the School of Forestry and Conservation* 145 Mulford Hall, Berkeley, California 94720.

PREPARATORY PROGRAMS

Preforestry (see page 79)

Preveterinary Medicine

Students must complete at least 90 quarter units, including the required courses listed below. This normally requires a minimum of two years of study and satisfies the course requirements for admission to the School of Veterinary Medicine. For further information see page 127.

Subject and unit requirements for the preveterinary medical curriculum are:

Chemistry (general, qualitative, organic, and quantitative)	25
Physics (general)	9
Biology, zoology, embryology	17
English composition and additional English or rhetoric	8
Animal science**	3
Restricted electives in social sciences and humanities†	17
Additional electives in social sciences, humanities or agriculture*	11
	—
	90

Requirements for the Bachelor of Science Degree

The University of California awards the degree of Bachelor of Science to candidates who satisfy the general University requirements, the College requirements, and the specific major requirements.

General University Requirements

The bachelor's degree is awarded to those candidates who satisfy the University requirements (pages 33-36) in regard to: Subject A, American History and Institutions, Scholarship, Residence and Applications for Degree Candidacy.

* Refer to page 127 for pass or not passed courses.

** May be waived if not available.

† Art, anthropology, economics, foreign languages, geography, history, music, philosophy, political science, psychology, and/or additional English, rhetoric, and mathematics.

College of Agricultural and Environmental Sciences Requirements

The Bachelor of Science candidate must complete a minimum of 180 units of University work. This total may include not more than 6 units of Physical Education 1 or 26. Of the total, 54 units must be in upper division courses (courses numbered 100-199). A maximum of 9 units of courses in the 300 and 400 series will be accepted toward satisfaction of the 54-unit upper division requirement.

The student must satisfy the requirements of one of the curricula in the College of Agricultural and Environmental Sciences. These consist of *core requirements* common to all majors in the curriculum and the *major requirements* that give depth to the program.

The eight curricula offered are designed to provide extensive preparation in the natural, physical, and social sciences and in the humanities so that the student will gain breadth of learning as well as depth in specific areas. The social science and humanities electives may be satisfied through courses on the Humanities and Social Sciences lists of the College of Letters and Science (page 114).

Curricula Requirements of the College

The eight curricula offered are designed to provide extensive preparation in the natural, physical, and social sciences and in the humanities so that the student will gain breadth of learning as well as depth in specific areas. With the exception of Family and Consumer Sciences, each curriculum contains the following minimum unit requirements in subject matter:

Agricultural and closely related subjects	36
Natural and physical sciences	36
Social sciences and humanities	36
Unrestricted electives	24

Credit By Advanced Placement Tests

Students may fulfill a part of the requirements in the College at the time of admission by credit allowed for College Entrance Examination Board Advanced Placement Test scores of 5, 4 or 3. Advanced Placement Test credit will fulfill requirements in the College for subject-matter where appropriate or as elective credit.

Pass or Not Passed Courses

The College wishes to stimulate intellectual curiosity and encourages its students to investigate new areas that may interest them. Hence, a student in good standing (not on probation) may register for one elective course on the average each term on a Pass or Not Passed basis without jeopardizing his grade-point average. Units earned shall be disregarded in calculating the grade-point average, but may be used to satisfy the requirements indicated in the various curricula by an asterisk (*). These are elective-type courses and are not courses that are specifically required. Permission of the adviser and Dean is required

on forms available at the Dean's office. The forms must be completed and filed by the deadline set for adding courses to the study list each term.

Faculty Advisers and Majors

Students are assigned advisers according to the major selected and must consult with their advisers each quarter for guidance in planning their academic programs both as to required and optional courses to be taken the following quarter. Advisers are listed by major in the front portion of the *Schedule and Directory*. *It is the student's responsibility to see that he fulfills the University, the College, and the major requirements for graduation.* If the student requests a credit check at the start of his senior year, he will be notified of the remaining requirements to be fulfilled prior to graduation.

A program of fewer than 12 or more than 18 units must be approved by the Dean of the College. However, a lower division course in physical education of not more than one unit may be added to the maximum number without such approval.

For purposes of registration, entering students who are undecided about the area in which they wish to study may, if interested in the agriculture program, designate *Agricultural Science* as their major, if interested in the Family and Consumer Sciences program designate *Home Economics* as their major, and if interested in the Resource Science program designate *Renewable Natural Resources* as their major. Temporary advisers will be assigned by the Dean's office until an appropriate major is selected. Enrollment in introductory courses (Animal Science 1, 2; Plant Science 1, 2, etc.) is recommended to provide background for selection.

Students may change their major within the College at any time, but in order to receive term credit in the new major the change must be made prior to the last day to add courses to the study list each term. Petitions for Change of Major are available at the Registrar's or the Dean's office. See page 28 concerning change from one college to another.

Work Experience Opportunities

One of the really unique programs available to all students on the Davis campus is the Agricultural Practices work-experience program. It enables students to acquire initial and advanced work experience in nearly all phases of the agricultural industry, including production, processing, marketing, and distribution. Summer placement on farms and ranches, with State and Federal Divisions of Forestry in range or wildlife management, and in the production, distribution and service organizations of agriculture, enables students to combine earning and learning activities in a broad and impressive spectrum of employment opportunities. Students, who are uncertain about the selection of a major, may use the experience to identify occupations leading to satisfying, productive careers.

Made possible by grant from the late Fred H. Bixby, the voluntary noncredit program enables students to supplement their academic training with supervised

work experience. Instruction in the operation, care and maintenance of both basic and specialized agricultural equipment is provided in the course, Agricultural Practices 49 (see Agricultural Practices page 149).

Students wishing to participate in this program should register during Orientation at the Agricultural Practices Office and complete a work-experience questionnaire.

Honors

Undergraduate Honors

The Dean's Honors List appears each quarter in the *Student Directory*. It includes the names of all students in the College of Agricultural and Environmental Sciences, who, in the preceding quarter, have completed at least 12 units on the Davis campus and have a grade-point average of at least 3.0 for all work undertaken in the University.

Senior students in honors status have the privilege of taking courses in the 194H series entitled "Special Study for Honors Students."

Honors at Graduation

The graduating student who is completing his major with distinction may be recommended for honors or highest honors. The names of students to whom honors and highest honors have been awarded are published in the commencement program, and the distinction is noted on their transcripts and diplomas. The minimum grade-point averages required to qualify for these honors are shown in the following table:

<i>Units Completed at the University</i>	<i>Grade-Point Average</i>	
	<i>Honors</i>	<i>Highest Honors</i>
135 or more	3.15	3.50
90-134	3.35	3.70
45- 89	3.45	3.80
Less than 45		not eligible

College Medal

Each year the outstanding graduating senior in the College is awarded a silver medal bearing the University Seal and known as the "Agricultural and Environmental Sciences Medal." Scholastic excellence is the primary basis for choosing the recipient, but other considerations also receive attention.

Scholarships

To encourage capable young men and women to pursue a career in the agricultural industries, many companies and private individuals have established scholarships restricted to students majoring in the College.

Approximately one-third of the scholarships administered by the Committee on Undergraduate Scholarships are awarded to students in the College of Agri-

cultural and Environmental Sciences. Students with high scholastic standings who need additional financial support are, therefore, encouraged to apply (see page 39).

Graduate Instruction

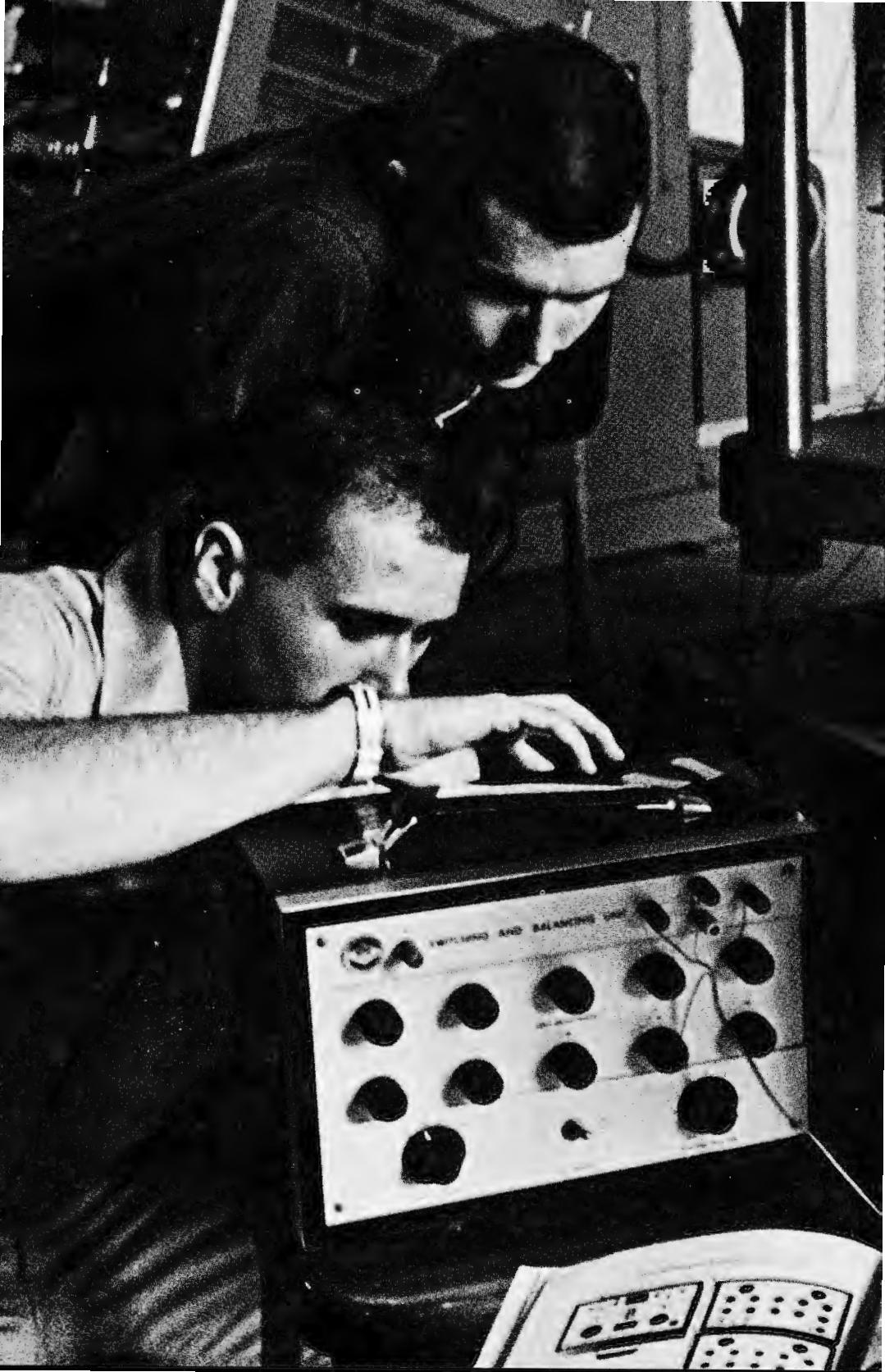
Graduate instruction is under the jurisdiction of the Dean of the Graduate Division, and inquiries concerning the graduate program should be addressed to him. In addition to pursuing advanced studies, the graduate student may qualify for an assistantship to work with members of the research staff in the Agricultural Experiment Station. A number of assistantships providing half-time employment during the academic terms and full-time summer employment are available to outstanding students.

Programs for certain graduate degrees are offered by the faculty of individual departments, and the degree normally bears the name of the department. Other graduate programs are offered by groups composed of faculty members from several departments, and the degree bears the name of the group, such as Agricultural Chemistry, Plant Physiology, Comparative Biochemistry, International Agricultural Development, etc. The *Announcement of the Graduate Division* should be consulted for complete information regarding graduate instruction, but work leading to advanced degrees may be pursued in the following departments of the College:

Agricultural Botany	Environmental Horticulture
Agricultural Economics	Food Science and Technology
Agricultural Engineering	Genetics
Agricultural Toxicology	Nematology
Agricultural Zoology	Nutrition
Agronomy	Plant Pathology
Animal Science	Pomology
Animal Physiology	Poultry Husbandry
Applied Behavioral Sciences	Soils and Plant Nutrition
Biochemistry and Biophysics	Vegetable Crops
Consumer Sciences	Viticulture and Enology
Entomology	Water Science and Engineering

Teaching Credentials

Inquiries concerning preparation for teaching credentials in subject matter of concern to the College should be addressed to the Department of Applied Behavioral Sciences, University of California, Davis 95616. Teacher education is provided not only in such specialized fields as home economics and vocational agriculture but also in more general areas.



WHEELING AND BALANCING

COLLEGE OF ENGINEERING

The University's curricula in engineering emphasize design, development, and research. Mathematical analysis, the basic sciences, and design are stressed in preparing the student for a professional engineering career.

Engineering curricula on the Davis campus include aerospace, agricultural, chemical, civil, electrical, and mechanical engineering. Each curriculum is a four-year undergraduate program leading to the Bachelor of Science degree. Graduate programs leading to the degrees Master of Engineering, Doctor of Engineering, Master of Science, and Doctor of Philosophy are offered.

Admission to Freshman Standing

General requirements for admission to the University are given on page 19.

High School Preparation for Engineering

It is important that students who plan to study engineering at the Davis campus include in their high school programs the following subjects:

	<i>Units</i>
Algebra*	2
Plane geometry*	1
Trigonometry*	½
Chemistry or physics (both are desirable)	1
Mechanical drawing	1

These subjects are prerequisite to certain basic courses in the freshman engineering program. A student who is admitted without all this preparation will be required to make up equivalent work while in college. As a result, he probably will be delayed in advancement to upper division status and in graduation.

Advancement to Upper Division Standing

The student who enters the College of Engineering in lower division standing is eligible for advancement to the upper division when he completes the lower division program with an overall grade-point average of 2.00 or better.

Admission to Upper Division Standing

To qualify for admission to the College of Engineering in upper division standing, the applicant must have completed at least 56 semester units (or 84 quarter units), including the following subjects, with an overall C (2.00) average.

	<i>Minimum number of semester units</i>
Analytic geometry and calculus	12
Chemistry (for engineering and science students)	8
Physics (for engineering and science students)	10
Engineering (subjects such as graphics, properties of materials, surveying, engineering measurements, statics, and circuit theory)	10
Humanistic-social studies (must be selected from the list of courses approved by the Committee on Undergraduate Study)	6

* Or equivalent integrated courses covering the same subject material.

	<i>Minimum number of semester units</i>
Unspecified subjects (6 units may be in humanistic-social studies; the remaining units should be in engineering, science, and mathematics, and may include units in mathematics, physics, chemistry and engineering in addition to the minimum numbers specified above. Students preparing for the Chemical Engineering curriculum at Davis should take in their sophomore year quantitative analysis and one course in organic chemistry with laboratory. None of these units may be in military science or physical education)	10 <hr/> 56

The student admitted to upper division standing on this basis will not be required to take additional lower division courses except those which are prerequisite to upper division courses in his curriculum or are specified requirements for the B.S. degree.

Note that the above subject requirements are *minimum*. Students who enter with only 56 semester units will probably require more than six quarters to complete an upper division engineering curriculum in the University.

With certain minor exceptions noted in the lower division program, students registered in the College of Engineering are not permitted to enroll in upper division engineering courses until they have been admitted to upper division standing.

The Bachelor of Science Degree

GENERAL UNIVERSITY REQUIREMENTS

The degree of Bachelor of Science is awarded to those candidates who satisfy the requirements of the University (pages 33-35) in regard to:

- Subject A
- American History and Institutions
- Scholarship
- Residence
- Application for Degree Candidacy

COLLEGE OF ENGINEERING REQUIREMENTS

The candidate for the degree of Bachelor of Science in Engineering must:

1. Satisfactorily complete the subjects and units prescribed in one of the engineering curricula.
2. Attain a grade C average in all courses of upper division level taken in satisfaction of required technical subjects and technical electives in the curriculum.

HONORS WITH THE BACHELOR'S DEGREE

Honors at graduation may be awarded to students who achieve distinguished scholarship records in all work undertaken after admission to the upper division as attested by recommendation of the Committee on Undergraduate Study of

the College of Engineering. Students who display marked superiority may be awarded highest honors at graduation.

FACULTY ADVISERS AND STUDY-LIST REQUIREMENTS

Upon admission to the College, each student is assigned to a faculty adviser and is under the guidance of the Dean of the College of Engineering and the Committee on Undergraduate Study. All programs of study are arranged in conference with the adviser and must be approved by him. However, *the student is held responsible for planning his program and for the satisfactory completion of graduation requirements.* Questions regarding deviations from a regular program of study should be discussed with the adviser and resolved at the earliest possible date.

A student who gives full time to University responsibilities is expected to enroll for the number of units specified in the curriculum in which he intends to graduate. Students may not enroll for more than 19 units or less than 12 units, exclusive of physical education, without the approval of the Dean of the College.

Of the total units required for the Bachelor of Science degree, at least the final 45 units characteristic of the curriculum selected must be completed while the student is registered in the College of Engineering.

HUMANISTIC-SOCIAL STUDIES

The curricula, in conformance with the regulations of the College of Engineering, include a minimum of 27 quarter units of study in the humanities and social sciences (exclusive of military science, physical education, Subject A, and any matriculation subjects). These studies are intended to help the student gain an understanding and appreciation of areas of learning other than engineering and the physical sciences. At least 8 quarter units must be completed after the student has received credit for 84 units of college work. The courses must be selected from an approved list that is reviewed annually by the College Committee on Undergraduate Study. The list includes courses from such fields as history, economics, government, literature, sociology, and fine arts; it does not include such courses as accounting, hygiene, industrial management, finance, and personnel administration.

TECHNICAL ELECTIVES

Each upper division program includes a specified number of technical elective units and lists suggested courses that may be taken as technical electives. With the adviser's approval, other appropriate courses in engineering, science, or mathematics may be taken in partial satisfaction of the technical elective requirement. A student who wishes to combine two or more technical areas may arrange such a program with the help of his adviser. Students who expect to undertake graduate study should elect additional courses in mathematics, the sciences, and basic engineering subjects as early as possible in their undergraduate program. The entire upper division program should be planned, at least tentatively, early in the junior year. Careful attention should be given to course sequences so that prerequisite courses will be taken at the proper time.

Lower Division Program

The lower division program is essentially the same for all engineering curricula except Chemical Engineering. It provides the beginning student with the fundamentals of science, mathematics, and engineering that are essential as preparation for the engineering sciences and professional studies of the upper division.

Courses required in the lower division program are listed below. Copies of a number of different program arrangements that have been worked out to fit various situations are available to the student through his adviser or in the College office. Students who wish to plan their own programs can do so by utilizing any combination of quarters listed in the last column.

Courses Common to All Curricula	<i>Quarter</i>	<i>Units</i>	<i>Usually Taken**</i>
Chemistry 1A-1B-1C (General Chemistry)	15	2-3-1 or 1-2-3	
Engineering 3 (Introduction to Engineering Systems)	3	1, 2, or 3	
Engineering 5A (Engineering Applications of Computers)	3	2, 3, or 5	
Engineering 35 (Statics)	3	4 or 5	
English 1 (Expository Writing)	4	Varies	
English 3 (Introduction to Literature) or Rhetoric 1A (Introduction to Public Speaking)	4	Varies	
Mathematics 11* (Analytic Geometry)	2	1	
Mathematics 21A-21B-21C (Calculus)	9	1-2-3	
Mathematics 22A (Linear Algebra)	3	4	
Mathematics 22B (Differential Equations)	3	5	
Mathematics 22C (Vector Analysis)	3	6	
Physics 4A-4B-4C-4D-4E (General Physics)	20	2-3-4-5-6	
Humanities and social sciences	4	Varies	
	<hr/>	<hr/>	<hr/>
	76		

Additional Courses in Aerospace, Agricultural, Civil, Electrical, and Mechanical Engineering Curricula

Engineering 4 (Engineering Graphics in Design)	3	1, 2, or 3
Engineering 17 (Circuits)†	3	5 or 6
Engineering 45 (Properties of Materials)	4	4 or 6
Mathematics 24 (Infinite Series)	2	6
Elective†	3	Varies
	<hr/>	<hr/>
	15	

Additional Courses in Chemical Engineering Curriculum

Chemistry 5 (Quantitative Analysis)	4	4
Chemistry 112A (Organic Chemistry)	5	6
Engineering 102A (Dynamics)†	3	6
Humanities and social sciences†	4	Varies
	<hr/>	<hr/>
	16	

* Students who have had analytic geometry in high school will substitute 2 units of free electives for Mathematics 11.

** Students majoring in Chemical Engineering usually use the last choice listed for each course.

† These courses are included in the upper division programs of the other curricula.

‡ Students majoring in Civil Engineering take Civil Engineering 10 in place of 3 units of electives, usually in quarter 3 or 6.

Upper Division Curricula

The upper division curricula in the several engineering areas (Aerospace, Agricultural, Chemical, Civil, Electrical, and Mechanical) are described in the following pages. Several courses required in the first quarter of the junior year are the same in most of the programs. The total undergraduate curriculum normally requires twelve quarters of study and leads to the Bachelor of Science degree.

AEROSPACE ENGINEERING CURRICULUM (182 Units)

Aerospace engineering is the application of scientific knowledge to flight in the atmosphere and beyond. Specific objectives are the design, development, and manufacture of airplanes, helicopters, missiles, rockets, satellites, and space stations. The undergraduate curriculum combines the study of basic engineering disciplines with courses in aerodynamics, guidance, propulsion, and structures. A broad range of technical elective courses is available from which the student may select subjects of a more specialized nature such as aeronautics, aerostructures, and astronautics.

The curriculum is organized to develop the student's ability to apply basic engineering principles in the design of engineering systems. This training is intended to prepare him for technical leadership in this rapidly changing field.

<i>Junior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 102A . . . 3	Engineering 101 . . . 2	Engineering 100 . . . 2	
Engineering 104A . . . 3	Engineering 102B . . . 3	Engineering 103B . . . 3	
Engineering 105A . . . 3	Engineering 103A . . . 3	Mechanical	
Elective 3	Engineering 104B . . . 3	Engineering 111 . . . 4	
Humanities-Social Sciences 3	Engineering 105B . . . 3	Mechanical	
		Engineering 121 . . . 3	
		Humanities-Social Sciences 4	
	<u>15</u>	<u>14</u>	<u>16</u>
<i>Senior Year</i>			
Engineering 186 . . . 4	Engineering 106 . . . 3	Engineering 190 . . . 3	
Electrical	Mechanical	Mechanical	
Engineering 150 . . . 3	Engineering 128 . . . 3	Engineering 123B . . . 2	
Mechanical	Humanities-Social	Humanities-Social	
Engineering 123A . . . 2	Sciences 4	Sciences 4	
Mechanical	Technical Electives . . . 6	Technical Electives . . . 6	
Engineering 127 . . . 3			
Technical Elective . . . 3			
	<u>15</u>	<u>16</u>	<u>15</u>

Suggested technical electives are: Engineering 180, 183, 187, 188; Applied Science 100, 115; Civil Engineering 131A, 131B, 135; Electrical Engineering 110A, 111A, 112A, 130A, 157A, 157B; Mechanical Engineering 124, 125, 130A, 130B, 135, 185A, 185B.

AGRICULTURAL ENGINEERING CURRICULUM (180 Units)

The program of study in agricultural engineering prepares the student to apply engineering principles to the problems of agriculture and related indus-

tries. Agricultural engineering involves extensive utilization of basic knowledge and techniques from several other fields of engineering; it is unique in that it also requires a general understanding and appreciation of biological and soil-management aspects of agriculture.

The technical electives in the program permit specialization in the areas of farm power and machinery, farm structures, agricultural processing, or some combination of these. Soil and water management is included in the civil engineering program.

The *power and machinery* area involves the design, development, and application of field machines and power units utilized in crop production and related activities. Economic aspects and the effects of machines on soils and crops are considered. Procedures for developing machine components and synthesizing them into an engineering system are treated.

Engineering in *farm structures* involves analysis of the structure in terms of space and labor utilization in relation to an overall enterprise, determination of the economic value to the enterprise, and consideration of basic design features. The structure is also considered as a means of providing an optimum environment for animal production, product storage and conditioning, or crop production in greenhouses. Thus, the biological aspects and the various meteorological factors are recognized in the basic analysis and design of structures.

Agricultural processing deals with the transformation of raw agricultural products into different, more usable, or more valuable forms, usually at the farm level. The basic aspects of drying, sorting, cleaning, handling, storage, size reduction, and heat and energy transfer, as well as the biological characteristics of the materials, are considered in the design of processing systems.

<i>Junior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 102A . . . 3	Engineering 100 . . . 2	Engineering 103B . . . 3	
Engineering 104A . . . 3	Engineering 101 . . . 2	Technical Electives* . . 8	
Engineering 105A . . . 3	Engineering 102B . . . 3	Humanities-Social	
Humanities-Social	Engineering 103A . . . 3	Sciences 4	
Sciences 3	Engineering 104B . . . 3		
Elective 3	Technical Elective* . . 3		
		16	15
<i>Senior Year</i>			
Agricultural	Agricultural	Agricultural	
Engineering	Engineering	Engineering	
Electives** 9	Electives** 4	Electives** 4	
Mechanical	Engineering 106 . . . 3	Engineering 190 . . . 3	
Engineering 118 or	Technical Elective* . . 3	Technical Elective* . . 3	
Civil Engineering	Humanities-Social	Humanities-Social	
131A 3	Sciences 4	Sciences 4	
Technical Elective* . . 3			
		14	14

Suggested technical electives:

General—Agricultural Economics 18, 140; Agricultural Engineering 106, 110,

* The technical electives must include at least 6 units in agricultural and biological sciences fields.

** Must be selected from the list of suggested agricultural engineering courses and must include units from at least two of the three areas (agricultural processing, structures, and power and machinery). Students are encouraged to take a course in each of the three areas.

114, 116, 117, 118, 125, 126, 132, 141; Geology 1A; Mathematics 105A; Water Science and Engineering 110A, 160.

Agricultural Processing—Engineering 105B, 186; Electrical Engineering 110A, 110B; Mechanical Engineering 185A, 185B; Chemistry 109.

Power and Machinery—Engineering 105B, 122, 184; Mechanical Engineering 114, 115, 121.

Structures—Civil Engineering 131B, 132A, 132B, 132C, 142, 148, 171, 172.

Agricultural and Biological Sciences—Agronomy 100; Animal Science 2; Biology 10; Plant Science 2; Soil and Water Science 2; Vegetable Crops 100.

CHEMICAL ENGINEERING CURRICULUM (182 units)

Chemical engineering is concerned with all processes and devices involving chemicals. The products of the process industries range from antibiotics to zirconium, from petroleum to plutonium, from agricultural chemicals and foods to synthetic plastics. Chemical engineers are increasingly concerned with chemical and engineering processes in animals and humans. Preparation 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 give the student a sound knowledge of engineering and chemical sciences so that he may achieve competence in treating not only current technical problems but also those that will arise in the technologies of the future. In the upper division, attention is focused on basic engineering courses, particularly thermodynamics, fluid mechanics, and energy and mass transfer. In the senior year these fundamentals are drawn together and applied in process and plant design. The program is strengthened and broadened with introductory courses in the electrical and mechanical sciences.

The curriculum includes several technical electives which allow for special training in an area of particular interest. For example, Davis offers a unique opportunity for specialization in biochemical engineering because of the extensive staff and facilities available in the biological and food sciences. By including elective courses from the Bacteriology, Biochemistry, and Food Science and Technology Departments, the student can obtain excellent preparation for graduate work or industrial employment in food processing and related biological fields.

6

Junior Year	Fall	Winter	Spring
Engineering 104A ... 3	Engineering 103B ... 3	Engineering 100 2	
Engineering 103A ... 3	Engineering 17 3	Chemical	
Chemical	Chemistry 112E 3	Engineering 152B . 3	
Engineering 151 .. 3	Chemistry 110B 3	Engineering 186 4	
Chemistry 110A 3	Chemical	Chemistry 110C 3	
Chemistry 112D 3	Engineering 152A . 3	Humanities—	
		Social Sciences ... 3	
—	—	—	—
15	15	15	15

<i>Senior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 101 2	Chemical	Chemical	Chemical
Chemical Engineering 154A . 3	Engineering 155A . 2	Engineering 155B . 2	Engineering 155B . 2
Chemical	Chemical	Chemical	Chemical
Chemistry 111 4	Engineering 154B . 3	Engineering 158 .. 3	Engineering 158 .. 3
Mathematics Elective* 3	Chemical	Chemical	Chemical
Technical Elective ... 3	Engineering 156A . 3	Engineering 156B . 3	Engineering 156B . 3
	Technical Elective ... 3	Chemical	Chemical
	Humanities-Social	Engineering 157 .. 3	Engineering 157 .. 3
	Sciences 4	Humanities-Social	Sciences 4
—	—	—	—
15	15	15	15

Suggested technical electives are: Engineering 102B, 104B, 186; Applied Science 115; Bacteriology 2; Biochemistry 101A, 101B; Biology 1, 4; Chemistry 121, 124, 126, 131, 150A, 150B; Civil Engineering 142, 148; Electrical Engineering 110A, 110B, 112A, 130A, 130B, 150; Food Science and Technology 101, 103, 104A, 104B, 106; Mathematics 118A, 118B, 119, 127A, 127B, 128A, 128B, 131A, 131B, 131C, 132A, 132B, 185A, 185B; Mechanical Engineering 125, 185A, 185B; Physics 115A, 115B, 121, 129A, 129B, 140.

CIVIL ENGINEERING CURRICULUM (180 Units)

Areas of specialization in civil engineering are environment engineering, structural engineering and mechanics, and water resources engineering.

Environment Engineering is concerned with improving and maintaining the qualities of the air, land, and water environment that affect the health and well-being of man in the face of increasing population and expanding industrial activity. The program depends 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.

Structural Engineering and Mechanics is concerned with the conception, design, and construction of structures. Structural engineering involves buildings, bridges, highways, dams, economics of the construction industry, and construction practices. Consideration is given to the response of structures not only to gravity loading but also to earthquake, wind, and blast loading. Structural mechanics emphasizes the more analytical aspects of structural engineering. Principles of structural analysis applicable to structures of all kinds, from office buildings to space vehicles, are examined. Special topics include the mechanics of deformable bodies and the theory of elasticity.

Water Resources Engineering includes programs in Hydraulics, Irrigation and Drainage, and Water Resources Systems Design. *Hydraulics* is concerned with flow in pipe and open-channel water-distribution systems and through hydraulic structures, and depends upon a strong foundation in fluid mechanics, systems analysis, and hydrology. *Irrigation and Drainage* provides a unique program aimed at the solution of water-oriented agricultural problems by emphasizing

* To be selected from the suggested list of mathematics electives.

the application of hydrologic sciences, hydraulic engineering, agricultural sciences, and system analysis to the design and operation of irrigation and drainage projects. Special topics include study of water-soil-plant relations, water rights, land preparation and water application, water quality, and soil and water pollution. *Water Resources Systems 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 and wastes of industry, agriculture, recreation, and other activities. The program may include elective courses in the geography, economics, and politics of water resources.

<i>Junior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 100 2	Engineering 102B ... 3	Engineering 103B ... 3	
Engineering 101 2	Engineering 103A ... 3	Civil Engineering	
Engineering 102A ... 3	Engineering 104B ... 3	131A 3	
Engineering 104A ... 3	Engineering 105A ... 3	Civil Engineering	
Geology 1 3	Civil Engineering	132B 3	
Elective 3	132A 3	Civil Engineering 171 3	
		Technical Elective .. 3	
<hr/> 16	<hr/> 15	<hr/> 15	
<i>Senior Year</i>			
Civil Engineering	Engineering 106 3	Engineering 190 3	
131B 2	Civil Engineering 148 3	Technical Electives .. 8	
Civil Engineering 142 4	Humanities-Social	Humanities-Social	
Civil Engineering	Sciences 8	Sciences 4	
172 2			
Technical Elective ... 3			
Humanities-Social			
Sciences 3			
<hr/> 14	<hr/> 14	<hr/> 15	

Suggested technical electives are:

Environment Engineering: Agricultural Engineering 106; Bacteriology 2; Biochemistry 101A, 101B; Chemistry 8A, 110A, 110B; Civil Engineering 145, 146, 147, 149; Geography 3; Mechanical Engineering 185A, 185B; Park Administration 110.

Structural Engineering and Mechanics: Engineering 122, 180, 183, 184, 187; Agricultural Engineering 125, 126; Applied Science 115; Civil Engineering 132C, 134, 135, 137, 138, 160, 173, 174; Mathematics 185A, 185B; Mechanical Engineering 188.

Water Resources Engineering: Applied Science 115; Chemistry 5; Civil Engineering 141, 143, 144, 145, 146; Electrical Engineering 112A, 150; Mechanical Engineering 185A, 185B; Soil and Water Science 103; Water Science 10, 110A, 116, 141, 150, 160.

ELECTRICAL ENGINEERING CURRICULUM (182 Units)

Present-day electrical engineering embraces a broad spectrum of disciplines based upon the physical and mathematical sciences. For example, the marvels

of electronics are being applied to such diversified fields as automation and control, information processing and computers, micro-miniaturization of circuits and components, biomedical applications, communications and microwaves, and stimulated energy emission by means of quantum effects (masers and lasers).

The course of study in electrical engineering allows the student maximum freedom to develop himself in special technical areas of his choice, while required courses insure his attainment of a broad background in basic electrical engineering. The common engineering core courses of the lower division provide a strong foundation for the specialized topics to follow. In addition, a specified group of upper division courses in network theory, field theory, systems, electronics, and communications theory prepares the student for the technical electives of his senior year.

Technical electives are a substantial part of the senior-year program. They may be selected from a wide range of courses in electrical engineering, other engineering fields, mathematics, and the physical and biological sciences. Typical fields of specialization are information and data processing, control theory, computers, communications, electronics, biomedical engineering, system theory, solid state, and high-frequency phenomena and devices.

The variety of course offerings permits the student to prepare himself for graduate study in electrical engineering, or to stop at the bachelor level with a sound background in his specialty. In the electrical engineering curriculum close correlation between theory and experiment is emphasized.

<i>Junior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 100 2		Engineering 103A . . . 3	Electrical
Engineering 101 2		Electrical	Engineering 110B . . 3
Engineering 102A 3		Engineering 110A . . 3	Electrical
Engineering 104A 3		Electrical	Engineering 111B . . 2
Engineering 105A 3		Engineering 111A . . 2	Electrical
Elective 3		Electrical	Engineering 112B . . 3
		Engineering 112A . . 3	Electrical
		Electrical	Engineering 130B . . 3
		Engineering 130A . . 3	Physics 121 3
	— 16	— 14	— 14
<i>Senior Year</i>			
Electrical		Engineering 106 3	Engineering 190 3
Engineering 133 . . 2		Technical Electives . . 6	Technical Electives . . 9
Electrical		Mathematics or	Humanities-Social
Engineering 146 . . 3		Physics Elective . . . 3	Sciences 4
Humanities-Social		Humanities-Social	
Sciences 7		Sciences 4	
Technical Elective . . 3	— 15	— 16	— 16

Suggested technical electives are: Applied Science 115; Electrical Engineering 116, 117, 131A, 131B, 131C, 145A, 145B, 145C, 150, 157A, 157B, 172, 173, 184A, 184B; Mathematics 105A, 105B, 128A, 128B, 128C, 129, 131A, 131B,

131C, 132A, 132B, 150A, 150B, 151A, 151B, 185A, 185B; Mechanical Engineering 124; Engineering 180; Physics 115A, 115B, 129A, 129B, 140.

MECHANICAL ENGINEERING CURRICULUM (182 Units)

The modern mechanical engineer uses basic science in the design and manufacture of complex engineering systems. This requires 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. The third year is spent in further study of fundamental courses, and in the fourth year the student may tailor his studies to his own interests by selecting courses in the fields of heat transfer, fluid mechanics, thermodynamics, mechanical design, or material science. With the range of electives available, the student can prepare himself for graduate study in mechanical engineering, or obtain a broad background for entering engineering practice at the bachelor's level.

<i>Junior Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Engineering 102A . . . 3	Engineering 101 . . . 2	Engineering 100 . . . 2	
Engineering 104A . . . 3	Engineering 102B . . . 3	Engineering 103B . . . 3	
Engineering 105A . . . 3	Engineering 103A . . . 3	Mechanical	
Elective 3	Engineering 104B . . . 3	Engineering 111 . . . 4	
Humanities-Social Sciences 3	Engineering 105B . . . 3	Mechanical	
		Engineering 121 . . . 3	
		Humanities-Social Sciences 4	
<hr/> 15	<hr/> 14	<hr/> 16	
<i>Senior Year</i>			
Engineering 186 . . . 4	Engineering 106 . . . 3	Engineering 190 . . . 3	
Electrical Engineering 150 . . . 3	Humanities-Social Sciences 4	Mechanical	
Mechanical Engineering 118 . . . 3	Technical Electives . . . 9	Engineering 123B . . . 2	
Mechanical Engineering 123A . . . 2		Humanities-Social Sciences 4	
Technical Elective 3		Technical Electives . . . 6	
<hr/> 15	<hr/> 16	<hr/> 15	

Suggested technical electives are:

Heat transfer—fluid mechanics—thermodynamics option: Engineering 180; Applied Science 100, 115; Electrical Engineering 110A, 111A, 112A, 130A, 157A, 157B; Mechanical Engineering 124, 125, 127, 128, 130A, 130B, 135, 185A, 185B.

Mechanical Design option: Engineering 122, 180, 183, 187; Agricultural En-



gineering 118; Applied Science 115; Civil Engineering 131A, 131B, 135; Electrical Engineering 110A, 111A, 112A, 157A, 157B, 172, 173; Mechanical Engineering 114, 115, 120, 124, 129A, 129B, 140, 184, 188.

Graduate Study

The Departments of Agricultural Engineering, Applied Science (Davis-Livermore), Chemical Engineering, Civil Engineering, Electrical Engineering, and Mechanical Engineering offer courses of study leading to the degrees of Master of Science and Doctor of Philosophy. These programs are particularly appropriate for those wishing to prepare themselves for careers in teaching, research or analytical design. Professional programs emphasizing design and leading to the degrees of Master of Engineering and Doctor of Engineering are offered by the Departments of Agricultural Engineering, Civil Engineering, and Mechanical Engineering.

At both master's and doctoral levels, the student plans his course of study with the help of an adviser or guidance committee. He is permitted wide latitude in the selection of courses and thesis subjects so long as his program is purposeful and well-integrated.

The graduate courses offered in the College of Engineering are described in the departmental listings (pages 199-219).

General information on graduate study may be found in the *Announcement of the Graduate Division* which can be obtained by writing to the Dean of the Graduate Division. Detailed information on graduate engineering programs is contained in the bulletin *Graduate Study in Engineering* obtainable from the Associate Dean, Graduate Studies, College of Engineering. Students interested in programs in Applied Science should request a copy of the *Announcement of the Department of Applied Science* from the Department of Applied Science, P.O. Box 808, Livermore, California 94551.



COLLEGE OF LETTERS AND SCIENCE

The College of Letters and Science offers curricula that enable the student to pursue fundamental knowledge primarily for its own sake and to learn basic intellectual disciplines. Programs of study in the College expose the student to man's social, aesthetic, and material achievements, as well as to the challenge of his ethical, political, and physical environment. In many cases the pursuit of cultural truths will also lead the student to an appreciation of the individual's capacity for unique creative expression. Such a liberal education has increasing vocational value, since more and more career opportunities presuppose a basic letters and science degree; nevertheless, the main emphasis in the College rests on the ends of living rather than on the means. A well-balanced liberal education, including specialized knowledge in his major field, prepares the graduate for a satisfying life whatever his career.

Graduation from the College of Letters and Science presupposes fulfillment of the general University requirements. In addition, to achieve its educational objectives, the College has established certain specific standards relating to scholarship, senior residence, and unit distribution within the student's program of study. The two most important standards determining the unit-distribution pattern are those which relate to the Breadth Requirements, and to the Departmental Major Requirement. The *Breadth Requirements* are designed to provide a broad background of knowledge and to promote a sensitivity in the student for cultural interrelationships. The *Major Requirement* enables the student to gain intellectual depth and competence in his chosen field of specialization. Requirements within the various departmental major programs are determined and administered by the separate departments, or, in the case of interdepartmental or group majors, by an interdepartmental committee or group.

The College offers the undergraduate degrees of Bachelor of Arts and Bachelor of Science. These degrees are conferred upon completion of the general University and College requirements, detailed below for each of these degrees. *Every student is responsible for seeing that he meets the University, College, and departmental or committee requirements for graduation.*

Should need arise, from the standpoint of the student, for changes at any time in the composition or unit load of his program of studies, the student is expected to take the initiative by promptly contacting his instructor, a faculty adviser, and—if necessary—the academic dean to insure effective action within the established deadlines. It is also the student's responsibility throughout the academic term to apprise himself of the quality of his performance by means of consultation with his instructors during their designated office hours.

The specific subject requirements for the bachelor's degree may be satisfied only by:

1. Courses in regular sessions of the University of California or University summer session courses identified with the letter "S."
2. Courses for which transfer credit is granted from another college or university.

Under exceptional circumstances, with prior written approval, the Dean of the College will permit students in residence to enroll in University Extension courses for elective credit only. No grade points are assigned for courses completed in University Extension.

General University Requirements

All candidates for the bachelor's degree are obligated to satisfy the University requirements (pages 33-35) in regard to:

Subject A

American History and Institutions

Scholarship

Maximum Unit Credit from Junior Colleges (see page 23)

Residence (for additional College stipulations, see page 35)

Application for Degree Candidacy

College of Letters and Science Requirements

UNIT DISTRIBUTION REQUIREMENTS

Satisfactory completion of a minimum of 180 units is required for graduation from the College of Letters and Science.

A. At least 150 units must be completed in courses given by departments in the College of Letters and Science (page 115) so as to provide the following distribution:

1. *English Reading and Composition*
A.B. and B.S. degrees: Satisfied by passing an examination in English composition. The examination, administered by the English Department at announced intervals, may be taken no earlier than the final quarter of the sophomore year.

Prerequisite: Subject A.

2. Breadth Requirements.

- a. *Foreign Language* (for details of this requirement see page 107).

<i>A.B. degree:</i> 18 units or the equivalent in one language.	<i>B.S. degree:</i> 18 units or the equivalent in one language begun in high school, or 12 units in one language begun in college.
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- b. *Area Requirements* (see page 114 for classification of courses).

<i>A.B. degree:</i>	<i>Units</i>	<i>B.S. degree:</i>	<i>Units</i>
Humanities		Humanities	
Natural Sciences	52	Social Sciences	22
Social Sciences		Natural Sciences	90
(12 units in one area and 20 in each of the two remaining areas.)			—
			112

3. At least 54 units must be in upper division courses in Letters and Science Teaching departments (see page 115).
- B. 1. Of the 30 units permitted from courses not offered by teaching departments in the College of Letters and Science.
 - a. Not more than 9 units may be in the 300-400 series.
 - b. Not more than 6 units of Physical Education 1 or 26 allowed.
2. Physical Education 1, 5 and 26 and all military science courses are included in the 30 unit limitation.
- C. Not more than 45 upper division units in one department may be counted toward the A.B. degree. (Change in regulation under consideration at time of publication.)
- D. Study programs totaling less than 12 units per quarter must be approved by the Dean of the College. The maximum program permissible without special approval by the Dean is 17 units for all freshmen, as well as for transfer students who are in their first quarter of residence.
- E. Credit in special study courses (numbered 198 and 199) may not exceed 5 units per quarter; see page 139.

SCHOLARSHIP REQUIREMENTS

In addition to the general University requirement of a C average (2.00) for all University work, the College stipulates separate averages of at least C for: 1) all courses required in the major program, and for 2) all upper division courses required for the major program.

At the option of the department or interdepartmental committee administering the major, students failing to meet the above conditions may be denied the privilege of pursuing that major.

Passed or Not Passed Privilege. A student not on academic probation has the option of registering for any one course each quarter on a "Passed" or "Not Passed" basis under the following conditions:

1. A grade of "Passed" shall be awarded only for work which would otherwise receive a grade of "C" or better.
2. The procedure for enrolling in a course (including deadlines) is published in the *Schedule and Directory*.
3. More than one course per quarter may be taken on this basis by accumulating options unused in previous quarters (beginning with spring quarter 1967).
4. A part-time student may enroll in courses on a "Passed" or "Not Passed" basis in the same proportion of his *total* program as permitted to a full-time student (one who undertakes at least 12 units each quarter).
5. Units earned with a "Passed" grade count toward the degree, but the course whether passed or not passed, is disregarded in computing grade-point average.
6. Graduating seniors as well as any other student planning to undertake graduate or professional studies should consult an adviser before enrolling in a required course on this basis.

Readmission after Dismissal. Dismissed students should contact the Dean of the College well in advance concerning the requirements to be met before their readmission can be considered.

SENIOR RESIDENCE REQUIREMENT

All candidates for the bachelor's degree must complete 35 of the final 45 quarter units in residence in the College of Letters and Science. While up to ten of the final 45 quarter units may be credited from another college in the University or from another four-year collegiate institution, any student planning to take senior-year work elsewhere should secure the approval of the College before undertaking such work. He should realize that a delay in granting the degree may result since credit is not allowed until an official transcript is received from the institution attended.

Students entering the College in senior standing from another institution or from another college or school within the University, must include in the final 35 units at least 27 quarter units of work in upper division courses offered by departments in Letters and Science, including at least 18 units in the major program.

Students enrolled in the Education Abroad Program may satisfy the senior residence requirement by completing 35 of their final 90 units, including the final 12, in residence.

REQUIREMENTS IN THE MAJOR

The number of upper division units a student must complete in the subject of his major varies among departments, the requirement ranging from 36 to 45 units. Major programs are designed by the Faculty of the College to insure that all students pursuing the same major will acquire certain knowledge in common. In addition, each student is encouraged to engage in independent study within the major.

A student must declare his major program by the time he has completed 84 units, but he may designate his preference at the beginning of his sophomore year.

A student may change from one major to another with the approval of the Dean of the College and with the consent of the department or committee in charge of the new major. Petitions for change of major are made on forms obtainable in Room 160, Administration Building. After the beginning of the senior year, a student may not transfer from one major program to another, or from B.S. to A.B. (or vice versa). A student may not elect a group major after beginning the final quarter of his junior year.

Three types of programs satisfy requirements for the major: departmental, interdepartmental, and group major programs.

A. Departmental Majors. The requirements for departmental major programs are described in detail under departmental listings. Any student who fulfills the major requirements of two departments in the College of Letters and Science may elect to receive a bachelor's degree in both fields. Major programs leading

to a Bachelor of Arts degree are offered in the following departments; those departments also offering programs leading to a Bachelor of Science degree are indicated by an asterisk (*):

Anthropology	Geology*	Physics*
Art	German	Political Science
Bacteriology*	Greek	Psychology
Botany*	History	Rhetoric
Chemistry*	Italian	Russian
Dramatic Art	Latin	Sociology
Economics	Mathematics*	Spanish
English	Music	Zoology*
French	Philosophy	
Geography	Physical Education	

A Bachelor of Science degree is offered in Animal Physiology, Biochemistry, and Genetics.

B. Interdepartmental Majors. These programs are intended for students interested in broader scope than that provided by a departmental major. Interdepartmental major programs leading to a Bachelor of Arts degree are offered in:

- American History and Literature (see page 151)
- Biological Sciences (see page 175)
- International Relations (see page 265)
- Physical Sciences (see page 292)

The Biological Sciences and the Physical Sciences programs also offer a Bachelor of Science degree.

C. Group Majors. An interdepartmental group major may be organized for a student having a specific academic interest not represented by an established major. Such a major involves interrelated courses from two or more departments and must consist of not fewer than 45 upper division units or more than 54. After preliminary consultation with the Dean of the College about this special program, the student plans his major with a member of the department in which he will do most of his work. He then submits the proposed program to the Dean at least four quarters before graduation for final approval by the Executive Committee of the College. This proposal must include: (1) a description of the special educational aims of the major and (2) a list of lower division prerequisites for the major and the required upper division courses. Group major request form and accompanying Petition for Change of Major are available at the Dean's Office.

BACHELOR'S DEGREE CANDIDATES

Senior Degree Check. At the beginning of his senior year, each student should request a *Degree Check* from the Dean's Office. A statement indicating any unfulfilled *University* and *College* degree requirements will be sent to the student. Information about progress in completing requirements in the *major* should be obtained by conferring with an academic adviser.

Filing for Candidacy. Each candidate for graduation must file an Announcement of Candidacy with the Registrar at the beginning of the quarter in which he plans to graduate. The dates for filing are published on pages 5-8 of this catalog.

Planning the Program

Before instruction begins each quarter, the student should prepare a tentative program of study and if needing academic counsel, meet with a faculty adviser to review his proposed program. The official study list must be filed with the Registrar according to the procedures described in the *Schedule and Directory*, available at the beginning of each quarter.

Undeclared Status. Entering freshmen and sophomores are officially designated as *Undeclared*. To insure counseling by an appropriate academic adviser, however, each student is asked to indicate a field of interest or unofficial major while in undeclared status. (Preprofessional students see page 110.)

Declaration of Major. A student may declare his official major at the end of his freshman year; he must do so by the end of his sophomore year. After obtaining a petition for Change of Major at the Dean's Office, he should report to the departmental office of his major choice to secure approval for admission to the major program. (Biological and Physical Science majors report to the Dean's Office.)

Study List Regulations. A study list totaling fewer than 12 units requires the approval of the Dean of the College, and will be allowed only in cases of poor health or regular outside employment. All freshmen as well as transfer students in their first quarter of residence may not undertake more than 17 units without special permission from the Dean. For purposes of calculating program load, the total number of units shown on the study list must include the unit value of repeated courses and of any course work not carrying degree credit (for example, Subject A and foreign language courses which duplicate high school training).

No course may be added to the study list after the tenth day of instruction, and, except in the case of prolonged illness or emergency, students will receive a grade of F in any course dropped after the third week of instruction.

Faculty Advisers. The purpose of the faculty adviser in the College of Letters and Science is to counsel the student on his overall program and to insure that he acquires a meaningful liberal education, makes normal progress toward completion of degree requirements, and undertakes an appropriate program of studies. The student should consult an adviser or the Dean of the College about any additional academic problems.

1. *Entering freshmen who participate in the summer advising program* are assisted in planning their fall quarter program by a temporarily assigned summer adviser. Assignments to regular advisers are indicated on rosters posted in the Administration Building at the beginning of the fall quarter.

2. *Other entering lowerclassmen* are assigned faculty advisers following the

Letters and Science Assembly scheduled during Orientation Week at the beginning of each quarter.

3. *New upperclassmen* report directly to the departmental office of their major during Orientation Week. (Biological and Physical Science majors report to the Dean's Office.)

4. *Limited students and special students* are under the supervision of the Dean of the College. Their study lists must be presented to the Dean each quarter for approval.

5. *All new students* are assigned to a faculty adviser. During their first three quarters in residence they are expected to consult their adviser every quarter and receive approval of their proposed programs.

6. *Continuing students* having completed three quarters in residence in the College are no longer obligated to consult an adviser; they can elect to see an adviser when in need of counsel.

ENTERING FRESHMEN

Because of the wide choice of subjects open to the Letters and Science student, a sample first-year program is not feasible. The entering freshman should, however, be able to plan his first-year program satisfactorily by keeping in mind the following points.

1. After the Subject A requirement has been met, most students should consider taking English 1 during their first year and English 2, 3, 4A, 4B or 5 their second year in preparation for the English Composition Examination. The Examination may be taken no earlier than the final quarter of the sophomore year.

2. The foreign language requirement should be completed by the end of the first or second year, as program priorities permit. It may be satisfied by examination or by completion of language courses.

a. *Placement Examination:* A student with only high school preparation may validate his knowledge of a foreign language by earning a satisfactory score on this examination. (Further information given below.)

b. *Course Completion:* A.B. degree—18 units in one language, or in most languages, through the fifth quarter course. B.S. degree—18 units in one language begun in high school or 12 units in a language begun in college, or through the third quarter course.

c. *Proficiency Examination:* A student who has not completed the required level language course, but assumes he has attained equivalent knowledge, may elect to satisfy the language requirement by passing this examination.

FOREIGN LANGUAGE PLACEMENT EXAMINATION

A student electing to continue a language studied in high school must take the Foreign Language Placement Test in that language. The placement test does not yield unit credit; it only determines whether the requirement has been met or whether additional work in the language is required. Students whose scores

place them below the course level expected on the basis of high school preparation (see table below) will receive reduced unit credit as follows:

- a. for placement into a course just preceding the normal continuation course, one-half the unit value of the course will be granted;
- b. for placement into any lower course, no unit credit will be allowed.

*Foreign Language Placement Equivalences
for French, German, Italian, Latin and Spanish**

Year-Level of High School Language	College transfer courses (4-unit semester equivalence)	Normal quarter-course continuation
0	0	first
1	0	first
2**	1	third
3	2	fourth
4	-	fifth
-	3	sixth

If there has been a time lapse in language preparation between high school and college, a student may wish to attend an appropriate level language course for no credit (audit) for one quarter before taking the Placement Examination. This can often lead to improved placement in the examination which a student may take only once in each language.

A student with advanced standing in a language does not qualify to take the Placement Examination. He should consult his status card, which is issued by the Dean's Office prior to admission to the College, for indication of further language study required.

Inquiries about the language requirement or the possibility of credit being withheld for duplicated work should be made at the Dean's Office, Room 160, Administration Building.

3. The Area Requirements in the humanities, natural sciences, and social sciences, for students enrolled in an A.B. program, require a total of 52 units (see page 114 for the three Area Lists).

These area requirements are particularly important for the entering freshman who has not decided on a major. Careful consultation with his adviser and thoughtful selection from each of the three groups will help the student to determine his preference for a major. Entering freshmen who feel certain of their major field should consult the requirements of that major in planning their first-year program, as a first-year course may be a prerequisite for further studies in that field.

* A student continuing a language not listed above should consult the Dean of the College of Letters and Science if placement or credit is in question.

** For students at this level placing in (or for transfer students electing) course 2, which would partially duplicate previous work, only one-half the unit value of the course will be granted.

ADVANCED PLACEMENT EXAMINATION CREDIT

Students earn 10 units credit toward their Bachelor's degree for each examination satisfactorily passed.
See chart below for details regarding course equivalences and breadth credit allowed toward graduation.

EXAMINATION	SCORE	UCD COURSE EQUIVALENCES	CONTINUING COURSE EQUIVALENCES	BREADTH CREDIT ALLOWED	REMARKS
English	5, 4, 3	English 1 and 3		None	No exemption from English Composition Examination.
Foreign Languages					
French	5, 4, 3	French 6	French 30a or 46a or concurrent enrollment.	4 units	
German	5, 4, 3	German 6a, 6b or 7	Any upper division course; German 101 strongly recommended.	4 units	The Foreign Language Requirement for the College of Letters and Science is satisfied by a score of 5, 4 or 3 on any language examination.
Latin 4	5, 4, 3	Latin 5, 103	Any upper division course except 103.	4 units	
Latin 5	5, 4, 3	Latin 101, 102	Any upper division course except 101 or 102.	8 units	
Spanish	5, 4, 3	Spanish 6	Spanish 20a; 101a may be taken concurrently.	4 units	
Humanities					
American History	5, 4, 3	History 17A, 17B		10 units	Humanities
European History	5, 4, 3	History 4A, 4B		10 units	Satisfies American History and Institutions Requirement.
Natural Sciences					
Biology	5, 4	Biology 1, Botany 2, Bacteriology 2, Zoology 2	Any upper division course or, by option, any Biological Sciences "2" course.	10 units	Natural Sciences
	3	Biology 1	Any Biological Sciences course except "10" series.	10 units	Student has option of taking Bacteriology 2, Botany 2 and Zoology 2 for full unit credit.
Chemistry	5, 4, 3	Chemistry 1A, 1B	See "Remarks"	10 units	
					Credit for Chemistry 1A and 1B equivalence may serve as prerequisite to 1C or 7A with instructor's consent; 1A and/or 1B, may, however be taken for full credit.
Mathematics	5, 4, 3	Mathematics 21A, 21B	Mathematics 21C	10 units	
Physics	5	Physics 10 or 2A, 2B	Determined by consultation with Physics adviser.	10 units	For score of 5 or 4, credit may equal with Physics 4A, 4B or 4A, respectively. Credit for Physics 4 courses given only with consent of Physics adviser.
	4	Physics 10 or 2A	Determined by consultation with Physics adviser.	10 units	
	3	Physics 10		10 units	

Preparation for Admission to Professional Schools

Since preprofessional programs are not major programs, students preparing for admission to a professional school are expected to follow the procedures governing the declaration of majors outlined on page 105 and to select courses which fulfill College requirements as well as their professional needs.

Since there are no specially designated preprofessional advisers in the College of Letters and Science, students planning to seek admission to a professional school should communicate as early as possible with the deans of the professional schools of their choice for precise admission requirements. Official announcements of admission requirements for the following schools within the University of California may be obtained from the Registrar:

Business Administration	Nursing
Dental Hygiene	Optometry
Dentistry	Pharmacy
Law (see page 117)	Physical Therapy
Medicine (see page 121)	

Those curricula preparing students for admission as undergraduates to professional schools in the University of California (Bay Area) are described below. (Scholarship stipulations refer to students with permanent legal residence in California.)

Business Administration

Completion of 90 quarter units of unduplicated college work, and fulfillment of the following specific requirements:

- a. English 1, 3; 4 additional units in the Departments of English, Rhetoric or Dramatic Art.
- b. Mathematics: 21A or 16A (may be counted toward the natural science requirement).
- c. Statistics: Mathematics 13 or Economics 12.
- d. Foreign Language: 12 units (through 3rd-quarter course) in one language, or the high school equivalent (6 units for the first two years, 6 units for each subsequent year). See additional requirement for B.S. degree in Business Administration.
- e. Natural Sciences: 2 courses (see additional degree requirement).
- f. Social Sciences: Economics 1A-1B, 11A-11B; Psychology 1A or Sociology 1, and one additional course in psychology, sociology or cultural anthropology.

Dental Hygiene

Completion of 90 quarter units of unduplicated college work and fulfillment of the following specific requirements:

- a. English 1, 3.
- b. Chemistry 1A, 1B; 8A, 8B.
- c. Biology 1; Zoology 2.
- d. Psychology 1A and one additional psychology course.

- e. Social Science, humanities or foreign language: 30 units must be selected from these fields.

Dentistry

Completion of 90 quarter units of unduplicated college work, and fulfillment of the following specific requirements:

- a. English 1, 3.
- b. Chemistry: 1A, 1B, 1C; 5, 8A, 8B.
- c. Physics: 2A, 2B, 2C; 3A, 3B, 3C.
- d. Biology 1; Zoology 2.
- e. Humanities, Social Science or Foreign Language: 20 units must be selected from these fields (including at least one, one-year sequence in one of these). A maximum of one course of mathematics may be substituted in partial satisfaction of this requirement.

Medicine (San Francisco Medical Center)

Completion of 135 quarter units of unduplicated college work, and fulfillment of the following specific requirements:

- a. English 1, 3.
- b. Chemistry: 1A, 1B, 1C; 5, 8A, 8B.
- c. Physics 2A, 2B, 2C; 3A, 3B, 3C.
- d. Biology 1; Zoology 2, 100.
- e. Foreign Language: 12 units (through third-quarter course) in one language, or three years of one language in high school.
- f. Humanities and/or Social Sciences: 18 units.
- g. Electives (to complete total of 135 units): recommended are courses satisfying Letters and Science College and departmental major requirements, but not anatomy, physiology, or bacteriology, which are part of the Medical School curriculum.

Nursing

Completion of 90 quarter units of unduplicated college work, and fulfillment of the following specific requirements:

- a. English 1, 3.
- b. Chemistry 1A, 1B; 8A, 8B will also be required beginning with the class entering in 1969.
- c. Biological Sciences: Biology 1; Bacteriology 2; Physiology 2, 2L; Human Anatomy 102.
- d. Foreign Language: 15–16 units (through 4th-quarter course) in one language, or the high school equivalent.
- e. Humanities: 16 units.
- f. Social Sciences: 16 units, including Psychology 1A and Sociology 1.

Optometry

Completion of 90 quarter units of unduplicated college work, and fulfillment of the following specific requirements:

- a. English 1, 3.

- b. Mathematics 16A-16B.
- c. Physics 2A, 2B, 2C; 3A, 3B, 3C.
- d. Psychology 1A-1B, 1C or 33.
- e. Biology 1; Bacteriology 2; Physiology 2, 2L.
- f. Chemistry 1A, 1B; 8A, 8B.

One quarter of Psychology 1C or 33 or Bacteriology 2 may be deferred until after admission to the School.

Pharmacy

Completion of 90 quarter units of unduplicated college work, and fulfillment of the following specific requirements:

- a. English 1, 3.
- b. Chemistry 1A, 1B, 1C.
- c. Physics 2A, 2B, 2C; 3A, 3B, 3C.
- d. Mathematics 16A, 16B, 16C.
- e. Biology 1; Botany 2; Zoology 2.
- f. Humanities, Social Science or Foreign Language: 9 units must be selected from these fields.

Physical Therapy

Completion of 135 quarter units of unduplicated college work, and fulfillment of the following specific requirements:

- a. English 1, 3.
- b. Chemistry 1A-1B.
- c. Physics 10.
- d. Psychology 1A, 168.
- e. Foreign Language: 15-16 units (through 4th-quarter course) in one language or the high school equivalent. (This may be counted from high school at the rate of 4 quarter units per year in the same foreign language.)
- f. Physiology 2, 2L; Human Anatomy 102.
- g. Natural Sciences: 39 units (courses such as general biology, kinesiology, and bacteriology may be used to satisfy this requirement). This requirement applies only if the bachelor's degree is earned before admission to the School.
- h. Humanities: 16 units (may include 4 units of American History and Institutions requirement).
- i. Social Sciences: 16 units (may include Psychology 1A and 168).

Preparation for postgraduate training in *Medical Technology* can be accomplished by completing the regular undergraduate major programs in Bacteriology and Biological Sciences (see pages 171 and 175).

Students preparing for postgraduate training in *Social Welfare* are referred to the introduction to Sociology course offerings (see page 328).

The Teaching Credential

The teacher-training program is administered by the Graduate Division. Certain undergraduate courses, however, are required as preparation for the pro-

gram. Students interested in obtaining the elementary or general secondary teaching credential should consult the appropriate adviser in the Department of Education as early as possible, preferably by the end of the freshman year (see also page 137).

Honors

THE DEAN'S HONORS LIST

The College publishes in the *Student Directory* an honors list, which includes the names of all students who have completed at least 12 units in the College and who also have at least B averages for all College, all University, and all collegiate transfer work undertaken.

Senior students on the honors list gain certain privileges:

1. Their study list may total less than 12 units per quarter.
2. They may earn more than 45 units of upper division degree credit in one department.
3. The department or committee supervising their major program may waive its requirements concerning specific courses or sequences in the major program.

(A change in honors policy under consideration at time of publication.)

HONORS PROGRAMS

Special programs for honors students are available in connection with certain major programs. These are described in the introduction to the department's course offerings. Interested students should consult their major advisers.

A student on the honors list may enroll, upon recommendation of his major adviser, in the honors program in his major at any time not later than the first quarter of his senior year.

BACCALAUREATE HONORS

Students on the Dean's Honor List who have attained a minimum 3.30 University grade-point average may qualify for honors, high honors, or highest honors with the bachelor's degree upon recommendation of the department or committee supervising the major program, the Committee on Honors, and the Executive Committee of the College of Letters and Science.

A list of students so honored is published in the annual Commencement Program.

AWARDS FOR ACADEMIC EXCELLENCE

In addition to eligibility for the University Medal (see page 36) graduating seniors with distinguished scholastic records in the College may be recommended by the faculty for the Herbert A. Young Letters and Science Medal. Academic excellence is the primary basis for choosing the recipient of this award.

Area Requirement Lists

The undergraduate courses in the subjects listed below will be accepted in fulfillment of the area requirements of the College. No course applied toward satisfaction of one area requirement may be offered to satisfy another. No courses marked with an "H," or numbered 48, 49, 198 or 199 may be counted toward the breadth requirements.

HUMANITIES

Art.	Latin. All courses except 1, 2, 3, 4, 5.
Classics.	Linguistics.
Dramatic Art.	Music.
English. All courses except 25 and 26 and <i>first</i> freshman-level course (i.e., English 1, 2, 3, 4A, 4B, or 5) completed. All subsequent courses in English counted toward humanities requirement.	Oriental Languages. All courses except Chinese 1, 2, 3, 4, 5; Hebrew 1, 2, 3, 4, 5; Japanese 1, 2, 3, 4, 5; Tamil 20; Telugu 1.
French. All courses except 1, 2, 3, 4, 5.	Philosophy.
German. All courses except 1, 2, 3, 4, 4R, 5, 5R.	Portuguese. All courses beyond 18 units.
Greek. All courses except 1, 2, 3, 101.	Rhetoric.
History.	Russian. All courses except 1, 2, 3, 4.
Italian. All courses except 1, 2, 3, 4, 5.	Sanskrit.
	Spanish. All courses except 1, 2, 3, 4, 5.

NATURAL SCIENCES

Animal Physiology.	Genetics.
Anthropology. Accepted: 1, 151, 152, 153, 154, 155.	Geology.
Astronomy.	Geography. Accepted: 1, 3.
Bacteriology.	Mathematics.
Biochemistry and Biophysics.	Physics.
Biology.	Physiology.
Botany.	Psychology. Accepted: 1B, 106, 108, 131, 131L, 150, 150L.
Chemistry.	Zoology.
Entomology. Accepted: 1.	

SOCIAL SCIENCES

Anthropology. All courses except 1, 13, 151, 152, 153, 154, 155, 195, 196.	Political Science.
Economics. All courses except 12.	Psychology. All courses except 1B, 3, 106, 108, 131, 131L, 150, 150L, 165.
Education. All courses except 114.	Sociology. All courses except 46A, 46B, 46C, 106.
Geography. All courses except 1, 3, 105, 161.	

TEACHING DEPARTMENTS IN COLLEGE OF LETTERS AND SCIENCE

Animal Physiology	Geology
Anthropology	German and Russian
Art	History
Bacteriology	Mathematics
Biochemistry and Biophysics	Music
Botany	Philosophy
Chemistry	Physical Education
Dramatic Art	Physics
Economics	Political Science
Education	Psychology
English	Rhetoric
French and Italian	Sociology
Genetics	Spanish and Classics
Geography	Zoology

A minimum of 54 upper division units (courses numbered 100-199) must be completed in courses offered by departments listed above. Courses offered in Military Science are acceptable only in the 30 unit non-Letters and Science limitation.



SCHOOL OF LAW

The School of Law offers a three-year curriculum of graduate study leading to the degree of Juris Doctor.

The School plans to combine the best features of traditional legal education with the development of new techniques and approaches necessary to the training of lawyers to meet the demands of the coming decades. The three-year curriculum will cover a broad spectrum. It will include, for example, courses transmitting the cultural traditions of the law and courses reflecting the Davis campus interests in natural resources and agriculture and the proximity of the state government in Sacramento. It is also planned to include a limited number of interdisciplinary courses. In terms of teaching techniques, increasing emphasis will be placed upon research and writing seminars and upon internship or other programs which bring students into direct contact with the legal profession in operation. An integral part of the teaching program will also be the publication by the students of a legal periodical. This periodical (initial publication of which is planned for the 1968-69 academic year) will strongly emphasize student writing and research.

Preparation for the Study of Law

No specific college major is required for admission to the School of Law, and there is no prescribed prelegal program. Degrees from the Colleges of Agriculture, Engineering, and Letters and Science are all acceptable. The individual student's college record and Law School Admission Test score must, of course, demonstrate that he is qualified for law study.

Prelegal students should plan a course of study that will give them a broad cultural background and include intensive work for a substantial period of time in a selected field of study. It is most important that prelegal students obtain mastery of the English language. They should be able to read rapidly and with comprehension and to express themselves clearly, completely, and concisely, both orally and in writing.

Requirements for Admission to the School of Law

Applicants for admission to the professional curriculum of the School of Law, leading to the degree of Juris Doctor, must have received a bachelor's degree or an equivalent degree from a college or university of approved standing before beginning their work in the School of Law. The applicant's college record must be of sufficiently high quality to demonstrate that he is qualified for the study of law. The work of the last two college years will be considered more heavily than that of earlier years.

The applicant must also achieve a satisfactory score on the Law School Admission Test. All applications are reviewed by the Law School Admissions Committee. Students are admitted only on a full-time basis and only in September.

Law School Admission Test

All applicants are required to take the Law School Admission Test administered by the Educational Testing Service. Testing centers have been established



for the convenience of applicants in all parts of the United States and in many foreign countries. Applicants are urged to take the test as early as possible, and in any event not later than February in the academic year prior to that in which they seek admission to the School.

Applicants should write to: Law School Admission Test, Educational Testing Service, Princeton, New Jersey 08540, to obtain application forms and information about the test and the location of testing centers.

Admission Procedures

1. Application for admission to the School of Law and to the Graduate Division of the University should be made on forms which will be supplied by the School and should be addressed to: Dean, School of Law, University of California, Davis, California 95616. *The application must be accompanied by a \$10 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 is May 1 of the year in which admission is sought, but earlier filing is strongly recommended.

2. Two copies of transcripts of college work through the first semester or quarter of the applicant's senior year should accompany or immediately follow his application forms. As soon as they are available, the applicant should submit two

copies of supplementary transcripts to cover any work he completes *after* making application.

3. The applicant should take the Law School Admission Test and request that his score be reported to the School of Law.

4. Acceptance by the School of Law is always subject to the admissions action taken by the Graduate Division of the University. Normally, applicants accepted by the School of Law will also be accepted by the Graduate Division.

Professional Curriculum and Degree

The course of study in the professional curriculum requires nine quarters for completion and extends over a period of three years. The work of the first year is prescribed; courses constituting the first-year curriculum are listed on page 268. This work provides the essential foundation for subsequent legal study, and the satisfactory completion of the first-year courses is in all cases a prerequisite to courses of the second and third years. First-year students who fail to attain satisfactory grades at the end of their first year may be required to withdraw from the School.

The curriculum—for the second and third years is almost wholly elective. It is set forth on page 268.

A third-year curriculum will be introduced in October of 1968.

The curriculum of the School is designed for full-time students only.

Students who have been admitted to the School as candidates for the professional degree and who have completed satisfactorily the professional curriculum and the required period of resident study will be recommended for the degree of Juris Doctor.



SCHOOL OF MEDICINE

The School of Medicine will admit its second class to a course of professional instruction commencing in the fall quarter 1969.

The degree of Doctor of Medicine requires the satisfactory completion of a four-year course of study comprised of 15 quarters. Initially, course work will be conducted in the temporary Medical School facilities on the Davis Surge Campus and in nearby affiliated hospitals. The current main clinical teaching unit is the recently renovated 600-bed Sacramento County Hospital. Permanent facilities will be available in 1973 with the completion of the combined Human Medicine—Veterinary Medicine Health Sciences Complex. Construction of a University hospital will be completed in 1975. An adjoining 740-bed Veterans Administration Hospital is proposed for concurrent construction. This building complex will provide a unique physical expression of the philosophical concept of a closely correlated exposition of health and disease in man as well as other species.

Premedical Requirements

Applicants for admission to the professional curriculum must have satisfactorily completed a minimum of three years (90 semester units; 135 quarter units) of college level work. However, in most instances completion of a four-year course of study leading to a bachelor's degree is recommended. A maximum of two years (60 semester units; 90 quarter units) of junior college work may be credited toward this requirement. Although a specific major in science is not necessary, the following course content is required:

- One year of English composition or its equivalent
- One year of biological science or its equivalent
- One year of general chemistry or its equivalent
- One year of organic chemistry* or its equivalent
- One year of physics or its equivalent
- Mathematics, *through* integral calculus

The student is strongly encouraged to fill out his program with course work in the humanities and social sciences.

A prospective student must have completed the Medical College Admission Test (MCAT) at such a time as to permit the availability of MCAT score results when the application is considered. This examination is given twice yearly, in May and October, at many colleges and universities. Further information may be obtained by writing: Medical College Admission Test, Psychological Corporation, 304 East 45th Street, New York, New York 10017.

Application

Application forms will be made available June 1, 1968. All information must be completed and submitted no later than December 31, 1968. Early return of the completed application will enable early processing, which is normally advantageous. Application forms and additional information are available from the

* This course must be the one normally offered for chemistry majors rather than one of a brief, or survey, character.

Admission's Office, School of Medicine, University of California, Davis, California 95616.

Transcripts of all college work should be sent directly from the school of origin to the Admissions Office. For undergraduate applicants not registered at a campus of the University of California, transcript of high school records is required. Final college transcripts should include a statement of good standing or honorable dismissal from the last college attended.

Admission Procedure

The second-year class will be limited to 48 students selected on the basis of intellectual achievement and personal characteristics which would lead the Admissions Committee to believe there was a reasonable likelihood of satisfactory completion of the requirements of the medical curriculum and subsequent effective discharge of the considerable demands of the profession. Factors taken into consideration include the applicant's scholastic record to date, MCAT performance, and reports of his teachers and advisers with regard to intellectual capacity, motivation, emotional stability and personal dedication.

A personal interview will normally be required. Prospective students whose applications are rejected during the initial screening procedure will be so notified and will not be called for an interview. Out-of-state interviews may be arranged in occasional cases in which a trip to Davis would be considered an undue hardship; in rare instances the Admissions Committee may waive the requirement for interview entirely.

Applicants may be requested to authorize their student health service or personal physician to send pertinent health information to the Admissions Committee.

In accordance with approved procedures of the Association of American Medical Colleges, applicants will usually be notified of the status of their application as early as September 15 of the year preceding that for which admission is sought. In some instances, a decision may not be made until March 31; however, an effort will be made to reach an early decision and to notify the applicant promptly.

The majority of places in each entering class will be awarded to students who are legal residents of the State of California; however, a certain number will be awarded to out-of-state students. This School of Medicine will also participate in the program of the Western Interstate Commission for Higher Education. In this program are a number of states which do not offer professional graduate medical education within the state. Applicants found eligible by both the School of Medicine and their own states are charged resident, rather than nonresident, tuition. Further information may be obtained by communicating with this Commission, whose address is University East Campus, 30th Street, Boulder, Colorado 80300.

Graduates of foreign universities will be considered on an individual basis by the Admissions Committee. Certain additional requirements apply to such applicants and detailed information is available from the Admissions Office.

Medical Curriculum and Degree

The course of professional study covers a period of 15 consecutive academic quarters extending over four calendar years. Successful completion of the prescribed curriculum will normally result in a recommendation by the faculty and the Dean leading to the award of the degree of Doctor of Medicine.

The faculty of this new school accepts the principles that it is impossible for the student to master in its entirety the rapidly expanding body of knowledge comprising modern medical science of today and that the gap between developing knowledge and an individual's ability for assimilation will widen each year. Accordingly, the curriculum will be presented in the context of *problem-solving*, based on a foundation in the sciences basic to medicine and the application of the scientific method to diagnosis, therapy and research in health and disease states. Correlation of the basic and clinical sciences will be emphasized during all stages of the professional program. Teaching by the faculty will be carried out by means of integrated exercises utilizing appropriate modern instructional methods and including the facilities of multidiscipline laboratories. To promote a habit of self-education throughout his professional life, the student will be encouraged to seek out individually available source material pertaining to the problems under consideration. Sufficient free time will be scheduled to permit pursuit of such studies in depth.

In general, the curriculum is designed around a core program of instruction in basic, behavioral and clinical sciences during the first three years, with the fourth year consisting of elective courses under faculty guidance. A graduate student orientation will prevail throughout the curriculum. At the same time, individual attention to the student will be emphasized. Elective courses will be offered during the four years, both on the general and medical campuses.

The *first academic year* (quarters 1, 2, 3) consists of a formal core program designed to equip the student with the vocabulary, tools, techniques and concepts of the Sciences Basic to Medicine, including molecular and cell biology, organ and system biology, and behavioral and environmental biology. Supplementing this is an introduction to clinical medicine designed to introduce the student to the patient, the history and physical examination, and to correlate the basic science with clinical problems at the earliest feasible time. A limited number of electives will be available.

The *second academic year* (quarters 4, 5, 6, 7) consists of a presentation of representative clinical problems illustrating the correlation of the basic and clinical sciences in understanding both the normal and abnormal states. The concept of a definition of the problem and the steps taken to solve it is stressed rather than preoccupation with the presentation of a large body of factual detail. Free time for study in depth is provided as well as an introduction to electives in areas of developing individual interest. There is a general orientation toward the principles of community medicine, including exposure to family practice, with consideration of the impact of psychosocial factors on the individual and his disease.

The *third academic year* (quarters 8, 9, 10, 11) consists of clinical clerkships



oriented toward a problem-solving approach to disease by bringing the student into direct contact with the patient and emphasizing the responsibilities of patient care. The concept of continuity of student-patient relationships is stressed, including follow-up of the patient's course. The student is also introduced to the principles of ambulatory care through the outpatient facilities.

The *fourth academic year* (quarters 12, 13, 14, 15) presents an opportunity for widely varied electives offered by the Medical School faculty and other schools of the Davis Campus. Faculty guidance (preceptor) is provided for each student in planning his elective program for this year. Emphasis will be placed on rounding out the needs of the individual student in order that he may proceed toward his goal. Where necessary the elective courses may be used to strengthen areas of recognized deficiencies.

By means of the above curriculum, the faculty intends to develop in the student the ability to pursue a plan of postgraduate studies leading to a career in private practice, teaching, research, preventive medicine, administration or any combination of these. It seeks to provide a comprehensive foundation upon which the individual student can more effectively realize his own interests, abilities and personal motivation. It is believed that through this approach the individual patient and the public may best be served.

Detailed information of the curriculum is available through periodic Announcements of the School of Medicine issued by the office of the Dean, School of Medicine.



SCHOOL OF VETERINARY MEDICINE*

The degree Doctor of Veterinary Medicine may be obtained by pursuing a course of study requiring a minimum of six years. The final four years must be spent in the professional veterinary medical curriculum.

Students planning a career in veterinary medicine should consider broadening their educational experience by completing the baccalaureate degree before applying to the professional school.

Preveterinary Medical Requirements

Students must complete a minimum of 90 quarter units (60 semester units) of college work including the required courses listed in the preveterinary medical curriculum (page 128) before they will be admitted to the School of Veterinary Medicine. Those who have met these requirements with excellent scholastic achievement may be admitted at the end of two years of study. However, all preveterinary medical students, in addition to satisfying the preprofessional course requirements, should plan their program so they can obtain a baccalaureate degree in four years. The School of Veterinary Medicine will accept the passed or not passed option (subject to general campus and individual school and college requirements) only in courses taken under the restricted electives in social sciences and humanities and the additional electives in social sciences, humanities, or agriculture (see page 81).

Application

Students are admitted to the School of Veterinary Medicine in the fall of each year. Application forms may be obtained after October 1 from the Admissions Officer, University of California, Davis 95616. The completed application must be filed with the Admissions Officer between January 1 and February 28 in order to be considered for the fall of the year in which application is made. Students may apply before completing all the requirements. However, they must submit a detailed list of courses in progress and a list of all courses to be completed by June 15 of the year they wish to be considered. *Applications lacking this information will not be processed.*

Admission to the School of Veterinary Medicine

Enrollment is limited, and applicants are selected primarily on the basis of scholarship with particular emphasis placed on achievement in chemistry, physics, and zoology. In addition, candidates should have sufficient experience with animals to justify their decision to pursue a lifetime career in veterinary medicine.

Personal qualifications also receive consideration. An interview may be required to enable the Committee on Admissions to make the most accurate judgment possible. Applicants will be notified before July 15 of their admission status.

Scholastic achievement, particularly in the required courses, is a very important criteria for admission to the School of Veterinary Medicine. Preveterinary medical students are, therefore, cautioned to use the passed or not passed option as sparingly as possible.

* For additional information prospective students should write the Dean, School of Veterinary Medicine, University of California, Davis 95616.

The School of Veterinary Medicine at the University of California participates in the student program administered by the Western Interstate Commission for Higher Education (WICHE). Students residing in western states without a school of veterinary medicine who wish to participate in this program must be certified by their home state. For addresses of state certifying officers, write to the Western Interstate Commission for Higher Education, University East Campus, 30th Street, Boulder, Colorado 80300.

AFTER ADMISSION

After admission to the School of Veterinary Medicine, the student completes a four-year professional curriculum leading to the degree Doctor of Veterinary Medicine. At the end of the first two years of the professional curriculum students who do not hold a baccalaureate are eligible to receive a Bachelor of Science degree in Veterinary Science.

Preveterinary Medical Curriculum

Applicants for admission to the School of Veterinary Medicine must complete:

1. Mathematics through trigonometry;* Subject A; and American History and Institutions.
2. At least 90 quarter units or 60 semester units of credit in the University of California or other accredited institution, including the prescribed subjects listed below. (Minor shortages may be waived by the Admissions Committee of the School of Veterinary Medicine.)

3. Subject Requirements:	<i>Quarter Units</i>
Chemistry (general, qualitative, organic, and quantitative)	25
Physics (general)	9
Biology, zoology, embryology	17
English composition and additional English or rhetoric	8
Animal science†	3
Restricted electives in social sciences and humanities‡	17§
Additional electives in social sciences, humanities or agriculture ..	11§
	90

Students completing the preveterinary medical requirements in institutions other than University of California, Davis, are urged to check the catalog of their college carefully to be sure they are taking equivalent courses.

<i>Freshman Year</i>	<i>Plan of Study</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Chemistry 1A, 1B, 1C		5	5	5
English 1 and additional English or rhetoric		4	4	-
Biology 1		-	-	6
Animal Science 2		-	-	3
Electives		6	6	1
		15	15	15

* Should be completed in high school.

† May be waived if not available.

‡ Art, anthropology, economics, foreign languages, geography, history, music, philosophy, political science, psychology, sociology, and/or additional English, rhetoric, and mathematics.

§ See page 81.

<i>Sophomore Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Physics 2A, 2B, 2C	3	3	3
Chemistry 8A, 8B, 5	3	3	4
Zoology 2	-	6	-
Zoology 100 (vertebrate embryology)	-	-	5
Electives	9	3	3
	—	—	—
	15	15	15

Requirements for the Degree Doctor of Veterinary Medicine

1. The candidate for the degree Doctor of Veterinary Medicine must have completed the general University requirements for a baccalaureate degree (pages 33-35).

2. He must possess good moral character.

3. He must have studied veterinary medicine for the equivalent of twelve quarters of twelve weeks each. The last six quarters must have been spent in the University of California School of Veterinary Medicine.

4. He must have completed the required work, satisfactorily fulfilled all special requirements, and received throughout the entire veterinary medical curriculum satisfactory grades as determined by the Faculty of the School and by the Graduate Council.

Plan of Study

<i>First Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>
Anatomy 140	2	Anatomy 155	Anatomy 160
Anatomy 150	2	Anatomy 156	Anatomy 161
Anatomy 151	4	Anatomy 157	Physiological Sciences
Genetics 100A	3	Physiological Sciences	123
Physiological Sciences 101A	4	101B	Physiological Sciences
Physiological Sciences 102A	1	Physiological Sciences 102B	140B
	—	Physiological Sciences 140A	Physiological Sciences 141B
	16	141A	Electives
	—	2	Anatomy 170
	18		Animal Science
			Mathematics 13
		—	—
		17	—

6

<i>Second Year</i>			
Pathology 122A	5	Epidemiology and Preventive Medicine	Anatomy 180
Physiological Sciences 124	4	140	Clinical Sciences 103. 4
Veterinary Microbiology 120	2	Pathology 122B	Pathology 122C
Veterinary Microbiology 121	3	Veterinary Microbiology 122	Veterinary Microbiology 125
Animal Nutrition 109. 3		Veterinary Microbiology 123	
	—	Veterinary Microbiology 124	
	17	—	—
		16	17



<i>Third Year</i>	<i>Fall</i>	<i>Winter</i>	<i>Spring</i>	
Clinical Pathology 201	3	Epidemiology and Preventive Medicine	Clinical Pathology 202	3
Clinical Sciences 204A	3	208	Clinical Sciences 204C	3
Clinical Sciences 210A	1	Clinical Sciences 204B	Clinical Sciences 210C	1
Clinical Sciences 220	. 4	Clinical Sciences 210B	Clinical Sciences 222.	5
Clinical Sciences 230	. 6	Clinical Sciences 221 . 5	Epidemiology and Preventive Medicine	
		Clinical Sciences 260 . 2	240	3
		Veterinary Microbiology 201 . 2	Epidemiology and Preventive Medicine	

Fourth Year

Epidemiology and Preventive Medicine	Clinical Pathology	Clinical Pathology
209	250B	1
Clinical Pathology	Clinical Sciences 204E	3
250A	Clinical Sciences 250B	8
Clinical Sciences 204D	Clinical Sciences 270 .	1
5	Pathology 250B	1
Clinical Sciences 250A	Electives	3
8		
Pathology 250A		
1		
—		—
17		17
—		—

Requirements for the Degree Bachelor of Science

Upon recommendation of the Faculty of the School of Veterinary Medicine the degree Bachelor of Science with a major in Veterinary Science is granted to students in the School of Veterinary Medicine who do not hold a baccalaureate and who:

1. Satisfy the general University requirements (pages 33-35).
2. Complete in the School of Veterinary Medicine all courses prescribed in the first two years of the professional curriculum. Exceptions may be made to students admitted in advanced standing.

Admission in Advanced Standing

An applicant requesting admission to advanced standing in the School of Veterinary Medicine may be accepted under the following conditions:

1. He must furnish evidence that he was eligible for admission to the first quarter of the School of Veterinary Medicine.
2. He must show that he has satisfactorily completed courses equivalent in kind and amount to those given in the School of Veterinary Medicine in the quarter or quarters preceding that in which admission is desired.
3. He may be required to pass examinations in any or all subjects for which credit is asked.

Graduate Study

The graduate study program of the School of Veterinary Medicine provides varied opportunities for advanced professional training and to launch careers in research. Degrees offered beyond the D.V.M. are Master of Science, Master of Preventive Veterinary Medicine, and Doctor of Philosophy.

General information regarding these degrees will be found in the *Announcement of the Graduate Division* which may be obtained from the Dean of the Graduate Division, Davis.

Additional detailed information may be obtained by writing the chairman of the department under which the candidate wishes to study.



GRADUATE DIVISION

Graduate study and research are administered by the Graduate Council, elected by the Academic Senate at Davis, and by the Dean of the Graduate Division. A University-wide Coordinating Committee on Graduate Affairs determines certain policies and establishes common procedures. Detailed information appears in the *Announcement of the Graduate Division*.

Advanced Degrees

On the Davis campus the following advanced degrees are offered: Master of Arts, Master of Science, Master of Education (in Agriculture), Master of Engineering, Juris Doctor, Master of Preventive Veterinary Medicine, Doctor of Engineering, Doctor of Veterinary Medicine, and Doctor of Philosophy.

The majors for graduate study and the advanced degrees offered in each are shown below:

Organization of Graduate Study

Agricultural Chemistry (Ph.D.)	German (M.A., Ph.D.)
Agricultural Economics (M.S., Ph.D.)	History (M.A., Ph.D.)
Agricultural Education (M.Ed.)	Home Economics (M.S.)
Agricultural Science and Management (M.S.)	Horticulture (M.S.)
Agronomy (M.S.)	International Agricultural Development (M.S.)
Anatomy (M.S., Ph.D.)	Irrigation (M.S.)
Animal Science (M.S.)	Law (J.D.)
Anthropology (M.A., Ph.D.)	Linguistics (M.A.)
Art (M.A.)	Mathematics (M.A., Ph.D.)
Biophysics (Ph.D.)	Microbiology (M.A., Ph.D.)
Botany (M.A., M.S., Ph.D.)	Music (M.A.)
Chemistry (M.S., Ph.D.)	Nutrition (M.S., Ph.D.)
Comparative Biochemistry (M.A., Ph.D.)	Philosophy (M.A., Ph.D.)
Comparative Pathology (M.S., Ph.D.)	Physical Education (M.A.)
Comparative Pharmacology and Toxicology (M.S., Ph.D.)	Physics (M.A., Ph.D.)
Dramatic Art (M.A.)	Physiology (M.S., Ph.D.)
Economics (M.A., Ph.D.)	Plant Pathology (M.S., Ph.D.)
Education (M.A.)	Plant Physiology (M.S., Ph.D.)
Endocrinology (M.A., Ph.D.)	Political Science (M.A., Ph.D.)
Engineering (M.Eng., D.Eng., M.S., Ph.D.)	Poultry Science (M.S.)
English (M.A., Ph.D.)	Preventive Veterinary Medicine (M.P.V.M.)
Entomology (M.S., Ph.D.)	Psychology (M.A., Ph.D.)
Food Science (M.S.)	Range Management (M.S.)
French (M.A., Ph.D.)	Russian (M.A.)
Genetics (M.S., Ph.D.)	Sociology (M.A., Ph.D.)
Geography (M.A., Ph.D.)	Soil Science (M.S., Ph.D.)
Geology (M.S., Ph.D.)	Spanish (M.A., Ph.D.)
	Vegetable Crops (M.S.)
	Veterinary Medicine (D.V.M.)
	Zoology (M.A., Ph.D.)

This list is under constant revision as graduate work expands into new areas of study, and prospective students seeking further information should consult the Graduate Division Office. The general requirements for these degrees are published in the *Announcement of the Graduate Division*, and the specific requirements are generally available from the office of the department concerned. The group majors, those which are sponsored by more than one department, are listed below and if a student is interested in one or more of these he should write to the group chairman as shown for more information as to specific requirements for the advanced degree.

- Agricultural Chemistry—John R. Whitaker, Ph.D., chairman, 106 Roadhouse Hall
Agricultural Science and Management—William C. Weir, Ph.D., Chairman, 162 Animal Science
Anatomy—Larry Z. McFarland, D.V.M., Ph.D., Chairman, 1042 Haring Hall
Biophysics—Richard S. Criddle, Ph.D., Chairman, 555B Hutchison Hall
Botany—Elizabeth G. Cutter, Ph.D., Chairman, 278 Robbins Hall
Comparative Biochemistry—Jack Preiss, Ph.D., Chairman, 578 Hutchison Hall
Comparative Pathology—Larry Z. McFarland, D.V.M., Ph.D., Chairman, 1072 Haring Hall
Comparative Pharmacology and Toxicology—Stuart A. Peoples, M.D., Chairman, 2147 Haring Hall
Endocrinology—Moses T. Clegg, Ph.D., Chairman, 218 Animal Science
Food Science—Lloyd M. Smith, Ph.D., Chairman, 204 Roadhouse Hall
Genetics—Robert W. Allard, Ph.D., Chairman, 201B Hutchison Hall
Horticulture—Dillon S. Brown, Ph.D., Chairman, 1043 Wickson Hall
International Agricultural Development—Trimble R. Hedges, Ph.D., Chairman, 109 Hunt Hall
Linguistics—Benjamin E. Wallacker, Ph.D., Chairman, 331 Voorhies Hall
Microbiology—Herman J. Pfaff, Ph.D., Chairman, 217 Cruess Hall
Nutrition—Howard F. Kratzer, Ph.D., Chairman, 214 Poultry Husbandry
Physiology—James M. Boda, Ph.D., Chairman, 118 Animal Science
Plant Physiology—Frederick T. Addicott, Ph.D., Chairman, 141 Robbins Hall
Preventive Veterinary Medicine—Calvin W. Schwabe, D.V.M., Chairman, 2086 Haring Hall
Range Management—R. Merton Love, Ph.D., Chairman, 131 Hunt Hall
Soil Science—Victor V. Rendig, Ph.D., Chairman, 251 Hoagland Hall

Admission Standards

Students seeking admission to graduate status at the University of California must hold a bachelor's degree or its equivalent from an institution of acceptable standing. The program of preparation should be substantially equivalent in both the distribution of academic subject matter and in scholarship achievement to the requirements for a comparable degree at the University of California. Applications for admission are evaluated in terms of scholastic qualifications and formal preparation for the graduate field of study.

The Dean of the Graduate Division or the department in which the applicant wishes to pursue an advanced degree may deny him admission if his scholastic record or his undergraduate program of study is judged not adequate as a foundation for advanced academic or professional study. This procedure applies to all applicants, whether they come from schools or colleges within the University of California or elsewhere. Individual departments may have special requirements for admission to graduate status, and certain departments and schools require an additional and special application for admission to their advanced-degree program.

Application for Admission

Students seeking admission for graduate work may obtain application forms from the Office of the Graduate Division of the University at Davis. Applications should be filed as early as twelve weeks before the date of registration but in no case later than July 15, 1968, November 15, 1968, and February 15, 1969, for the fall, winter, and spring quarters respectively. The application must be accompanied by a money order or bank draft for \$10.00, made payable to The Regents of the University of California, in payment of the application fee, which will not under any circumstances be refunded. If the complete record as specified below is not filed in time, the student may not be allowed to register or he may be allowed to register late on payment of an additional fee of \$10.00.

Official transcripts of record covering all college and university work completed to date, together with official evidence of degrees conferred, must accompany or immediately follow the application. A separate original and official record must be presented from each institution previously attended. Unless all of these are on file in the Graduate Division, registration cannot be permitted. In addition, the student should have in his possession a second copy of his official records for his use in conference with departments.

A separate and additional application is required for admission to the School of Law and the School of Veterinary Medicine. Students are referred to pages 111 and 121 for further details.

Every new student and every student returning to the University after an absence of one or more quarters must satisfy the medical requirements as described under "Medical Evaluation" (see page 45).

Readmission

Persons formerly registered in a regular session as graduate students who wish to return after an absence must apply for readmission. The form for this purpose is obtainable from the Registrar, and no fee is charged.

Foreign Students

Applicants for admission to the Graduate Division on credentials from universities and colleges in foreign countries are advised to make their initial inquiry as early as six months before the date of intended enrollment to permit processing of their records.

Students whose undergraduate preparation has been in a language other than English should furnish positive evidence that their command of both spoken and written English will permit them to profit by the instruction offered and to compete with American students. Certificates of proficiency in English by individuals (usually professors) are helpful, and consular testing at the time the I-20 form is processed is valuable, but neither of these is standardized or quantitative. A number of other tests given by authorized examiners abroad are acceptable. These include the Michigan Test (English Language Institute Test, University of Michigan), the interview reports supervised by the directors of the Institute of International Education overseas office, and the American University Language Center (A.U.L.C.) Test. Prospective students are encouraged, however, to submit scores on the Test of English as a Foreign Language (TOEFL) administered by the Educational Testing Service for the College Board. These tests are given at many testing centers abroad three times a year, and full information is available from the Educational Testing Service, Princeton, New Jersey 08540.

On arrival all foreign students take the special University examination in English; those who do not pass are assigned to remedial courses which may delay their graduate program. Even though the student has been admitted, his registration may be delayed until he acquires an adequate command of English.

Admission Without an Advanced Degree Objective

Students who do not wish to become candidates for a higher degree may be admitted to a specified field of study for course work only. Their program, which requires the approval of the Dean, must have a definite scholarly or professional purpose. The scholastic requirements for admission are the same as for those who are candidates for degrees. All such students who are not residents of the State of California will have to pay the regular tuition fee.

Program of Study

When the student registers and declares his degree objective, he is assigned to the appropriate adviser, who will advise him on his program of study. This will depend to some degree on the undergraduate training, and the student may be assigned to undergraduate courses to complete deficiencies.

Each student must satisfy the specific requirements for the degree sought as published in the *Announcement of the Graduate Division*. The general program in an area of study, as established by the department or group and approved by the Graduate Council, often includes a core of required courses, but considerable flexibility is permitted to suit the individual student's needs or main interest. More detailed information is available from the department or group concerned. Undergraduates at Davis who plan to pursue graduate study should confer with their major adviser early in their senior year to guarantee adequate preparation.

Teacher Credential Program

Programs leading to a Standard Teaching Credential with specialization in elementary teaching and in secondary teaching are offered under the jurisdiction of the Graduate Division. Graduate students who are prospective candidates for an advanced degree may take special professional courses and qualify for the junior college teachers credential.

The curricula for teacher education are offered by the Department of Education and the Department of Applied Behavioral Sciences, and interested students should obtain detailed information at either department. The courses in professional education required for the credential are specified in this catalog under the Departments' listing of courses of instruction (see pages 165 and 197). Subject-matter requirements for the teaching major and minor are specified with departmental offerings.

Only students who have completed the bachelor's degree are eligible, and they must be admitted to the program by the Graduate Division. Final filing dates and the application forms may be obtained from the Graduate Division Office. The student must maintain a scholarship record of 2.75 or better in all graduate work undertaken. In addition to the Graduate Division application, an application for the Department of Education is necessary for those who wish to be admitted for the credential program. Application for the 1969-70 program should be made in Room 228 Voorhies before November 1. Exceptions to this rule are made only at the discretion of the Head of Teacher Education.

Since the requirements for the credential are set up both by the State Department of Education and by the University, all students who intend to work for the credential are urged to consult the adviser in one of the departments named above early in their undergraduate career (preferably by the end of their freshman year).

Curricula are offered which lead to the Standard Teaching Credential with a specialization in elementary teaching or in secondary teaching and to the secondary credentials required for teaching classes reimbursed under the National Vocation Acts. Two routes for obtaining each type of credential are available: a student-teaching program (the usual route) and an internship program (limited in enrollment). Application for the intern program should be made to the department early in the senior year.

Intercampus Exchange Program

A graduate student registered on any campus of the University may become an Intercampus Exchange Student with the approval of his graduate adviser and the Dean of the Graduate Division on both the home and the host campus. The Intercampus Exchange Student has library, infirmary, and other student privileges on the host campus but is considered as a graduate student in residence on his home campus. The grades obtained in courses on the host campus are transferred to his home campus and entered on his official record. Forms for application for the intercampus exchange may be obtained at the office of the Dean of the Graduate Division.

Fellowships, Assistantships, and Loans

Fellowships are awarded by the Fellowship Committee of the Graduate Council on the bases of scholarship and promise of outstanding academic and professional contribution. For further information as to the awards available and application forms the student may consult the Fellowship announcement published in November for the following academic year. Applications with all the supporting records should be filed by February 1 to receive consideration.

Teaching assistantships and research assistantships are available in many departments, and interested students should inquire at the office of the department in which they wish to study.

Certain departments may be authorized to offer a limited number of fellowships under the National Defense Education Act and traineeships under the National Science Foundation or the National Institute of Health. For these the student may write directly to the department or to the Graduate Division of the University. Information regarding Graduate Fellowships supported by various federal agencies and others is also available at the Office of the Graduate Division.

Application for loan funds for graduate students should be addressed to the Office of the Dean of Students (see page 40).

AN INDEX TO COURSE OFFERINGS BY COLLEGE OR SCHOOL AND BY DEPARTMENTS, COMMITTEES, AND GROUPS

College of Agricultural and Environmental Sciences

AGRICULTURAL ECONOMICS	145
Agricultural Economics	150
Agricultural Education	165
AGRICULTURAL ENGINEERING	148
AGRICULTURAL PRACTICES	149
AGRICULTURAL SCIENCE AND MANAGEMENT (<i>a Committee</i>)	149
AGRICULTURAL TOXICOLOGY (<i>a Committee</i>)	151
Agronomy	301
Animal Biochemistry	157
Animal Genetics	157
ANIMAL SCIENCES (<i>a Committee</i>)	154
Animal Science	150, 156
APPLIED BEHAVIORAL SCIENCES	165
Applied Behavioral Sciences (under FAMILY AND CONSUMER SCIENCES)	231
Atmospheric Science	319
BIOCHEMISTRY AND BIOPHYSICS	173
Consumer Economics (under FAMILY AND CONSUMER SCIENCES)	232
Design (under FAMILY AND CONSUMER SCIENCES)	232
ENTOMOLOGY	225
Environmental Horticulture	302
FAMILY AND CONSUMER SCIENCES (<i>a Committee</i>)	230
FOOD SCIENCE (<i>a Committee</i>)	237
FOOD SCIENCE AND TECHNOLOGY (under FOOD SCIENCE)	238
Food Science and Technology	150
Foods (under FAMILY AND CONSUMER SCIENCES)	233
GENETICS	245
Home Economics Education (under FAMILY AND CONSUMER SCIENCES)	234
Home Management (under FAMILY AND CONSUMER SCIENCES)	234
Human Development (under FAMILY AND CONSUMER SCIENCES)	234
Institution Management (under FAMILY AND CONSUMER SCIENCES)	235
INTERNATIONAL AGRICULTURAL DEVELOPMENT (<i>a Committee</i>)	265
NEMATOLOGY	283
Nutrition (Animal)	158
Nutrition (under FAMILY AND CONSUMER SCIENCES)	235
Park and Recreation Administration	319
Physiology (Animal)	159
Plant Pathology	304
Plant Science	150, 301
PLANT SCIENCES (<i>a Committee</i>)	298
Pomology	305

Range Management	320
Renewable Natural Resources	320
RESOURCE SCIENCES (<i>a Committee</i>)	317
Soil Science	320
Soil and Water Science	150, 321
Textiles and Clothing (under FAMILY AND CONSUMER SCIENCES)	236
Vegetable Crops	305
Viticulture and Enology (under FOOD SCIENCE and PLANT SCIENCES)	240, 306
Water Science	322
Wildlife and Fisheries Biology	323

College of Engineering

ENGINEERING (<i>Core Courses</i>)	199
ENGINEERING: AGRICULTURAL	201
ENGINEERING: APPLIED SCIENCE	203
ENGINEERING: CHEMICAL	206
ENGINEERING: CIVIL	208
ENGINEERING: ELECTRICAL	213
ENGINEERING: MECHANICAL	216

School of Law

LAW	268
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School of Medicine

Anesthesiology	277
Human Anatomy	277

College of Letters and Science

AMERICAN HISTORY AND LITERATURE (<i>a Committee</i>)	151
ANTHROPOLOGY	162
ART	166
Astronomy (under PHYSICS, DEPARTMENT OF)	294
BACTERIOLOGY	171
BIOLOGICAL SCIENCES (<i>a Committee</i>)	175
BIOLOGY	176
BOTANY	176
CHEMISTRY	180
Chinese	284
CLASSICS	183
DRAMATIC ART	189
ECONOMICS	193
EDUCATION	197
ENGLISH	219
FRENCH	242
GEOGRAPHY	247
GEOLOGY	249

GERMAN	252
Greek	184
Hebrew	285
HISTORY	258
INTERNATIONAL RELATIONS (<i>a Committee</i>)	265
ITALIAN	266
Japanese	285
Latin	185
LINGUISTICS (<i>a Committee</i>)	270
MATHEMATICS	271
Micronesian Languages	285
MILITARY SCIENCE	278
MUSIC	280
ORIENTAL LANGUAGES	284
PHILOSOPHY	286
PHYSICAL EDUCATION	289
PHYSICAL SCIENCES (<i>a Committee</i>)	292
PHYSICS	293
Physiology (under ZOOLOGY, DEPARTMENT OF)	338
POLITICAL SCIENCE	307
Portuguese	333
PSYCHOLOGY	313
RHETORIC	324
RUSSIAN	326
Sanskrit	186
SOCIOLOGY	328
SPANISH	332
SUBJECT A	335
Tamil	285
Telugu	285
ZOOLOGY	337

School of Veterinary Medicine

ANATOMY	152
CLINICAL PATHOLOGY	186
CLINICAL SCIENCES	187
EPIDEMIOLOGY AND PREVENTIVE MEDICINE	228
PATHOLOGY	286
PHYSIOLOGICAL SCIENCES	297
VETERINARY MICROBIOLOGY	336

Graduate Groups

AGRICULTURAL CHEMISTRY	145
COMPARATIVE BIOCHEMISTRY	189
INTERNATIONAL AGRICULTURAL DEVELOPMENT	265
MICROBIOLOGY	278
NUTRITION	284



Courses of Instruction

Explanatory Note

Credit for academic work undertaken at the University is evaluated in terms of units. The value of a course is reckoned at the rate of one unit for three hours' work per week per quarter; on the part of the student. Included in these three hours may be one hour of lecture or discussion, or two to three hours of laboratory. For most courses, it is expected that the average student will spend two hours in preparation for one hour of lecture or recitation. If the number of hours of lecture or discussion given in the catalog is less than the number of units of credit assigned to the course, this means that some form of additional non-classroom work (for example, a term paper) is required of the student in that course. Students should inquire of the instructor at the first class meeting concerning this point.

The credit value of each course in quarter units is indicated for each quarter by a number in parentheses following the title.

The quarter in which the course is given is shown as follows: I, fall quarter (September to December); II, winter quarter (January to March); III, spring quarter (April to June).

When a course is listed as offered in even-numbered years or odd-numbered years, this refers to the calendar year in which the involved quarter occurs. For example:

"Philosophy 132. III. Offered in odd-numbered years," would be given in the spring quarter of 1967, 1969, and so on, whereas

"Philosophy 146. III. Offered in even-numbered years," would be given in the spring quarter of 1966, 1968, and so on.

Information concerning class hours is given in the *Schedule and Directory*.

A course number followed by two or three letters (for example, Mathematics 131A-131B-131C) is continued through three successive quarters, ordinarily from September to June; occasionally, however, a course of two quarters may begin in the winter quarter (for example, Spanish 101A-101B). The first quarter of such courses is prerequisite to the second, and the second to the third. Where A and B portions of a course are listed separately (for example, Economics 100A and Economics 100B), the A course is not prerequisite to B unless it is specifically mentioned in the listing of the B course.

Classification and Numbering

Courses are classified and numbered as follows:

Undergraduate courses. These are of two kinds, *lower division* (numbered 1-49) and *upper division* (numbered 100-199). Freshman and sophomore students are not normally encouraged to take upper division courses.

Special study courses numbered 48 offer an opportunity for a professor or lecturer to lead the exploration of a subject with a group of interested students. The subject matter considered may be broad in scope or relatively narrow and specialized. Admission is by consent of the instructor, and all students are eligible. Freshman Seminars are numbered 49.

Special study courses numbered 198 and 199 are designed for students having an adequate background in the subject proposed for special study. This would normally require a sound background in upper division courses in the field of 198 or 199 course study. Credit in special study courses may not exceed 5 units per quarter.

Departments may offer special *honors courses* (marked H) in reading and research, with credit to be determined by the instructors in charge, according to the performance of the individual students, subject to such general restrictions as may be imposed by the department, the college, or the Committee on Courses of Instruction of the Academic Senate. The work of the student in an honors course may consist of additional work in connection with other courses of instruction.

Graduate courses. Graduate courses (numbered 200–299) are open only to students who have adequate preparation; admission is subject to the approval of the instructor in charge.

Professional teacher-training courses in the Department of Education and courses in other departments that are specially intended for teachers or prospective teachers are numbered 300–399.

Professional courses in departments other than the Department of Education are numbered 400–499.

Extra-session courses. Extra-session courses (laboratory, field, or other individual work done out of session 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.

University Extension courses. Simultaneous enrollment in resident courses and in extension courses is permitted only when the entire program of the student is duly approved by the appropriate dean or study-list authority.

Credit for summer session work at other schools. 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. However, assurance that such credit will be accepted can be given only after the courses have been completed. Students should arrange to have the transcripts of their summer session grades sent to the Registrar for evaluation.

SYMBOLS

The following numerical footnotes and their accompanying symbols are used throughout the course section:

- ¹ Absent on leave, 1968–69.
- ² Absent on leave, fall quarter 1968.
- ³ Absent on leave, winter quarter 1969.
- ⁴ Absent on leave, spring quarter 1969.
- ⁵ Sabbatical leave in residence, 1968–69.
- ⁶ Sabbatical leave in residence, fall quarter 1968.
- ⁷ Sabbatical leave in residence, winter quarter 1969.
- ⁸ Sabbatical leave in residence, spring quarter 1969.
- * Not to be given, 1968–69.

† Not to be given, fall quarter 1968.

‡ Not to be given, winter quarter 1969.

§ Not to be given, spring quarter 1969.

To be given if a sufficient number of students enroll.

AGRICULTURAL CHEMISTRY (A Graduate Group)

John R. Whitaker, Ph.D., *Chairman of the Group*
Group Office, 238A Cruess Hall

Graduate Courses

290. Seminar (1) I, II.

Seminar—1 hour. Prerequisite: consent of instructor. The Staff

299. Research. (1-9) I, II, III, S.

Prerequisite: graduate standing and consent of instructor. Open to qualified graduate stu-

dents who wish to pursue original investigation. Arrangements should be made well in advance with a member of the Group in Agricultural Chemistry who will supervise the research and determine the credit value. The Staff

AGRICULTURAL ECONOMICS

J. Herbert Snyder, Ph.D., *Chairman of the Department*
Department Office, 117 Voorhies Hall

Professors:

- Harold O. Carter, Ph.D.
 Gerald W. Dean, Ph.D.
 Daniel B. DeLoach, Ph.D., D.Lit.
 J. Edwin Faris, Jr., Ph.D.
 Jerry Foytik, Ph.D.
 Benjamin C. French, Ph.D.
 Trimble R. Hedges, Ph.D.
 Gordon A. King, Ph.D.
 Chester O. McCorkle, Jr., Ph.D.
 J. Herbert Snyder, Ph.D.
 James M. Tinley, Ph.D. (*Emeritus*)

Associate Professors:

- Samuel H. Logan, Ph.D.
 Stephen H. Sosnick, Ph.D.

Assistant Professors:

- Hoy F. Carman, Ph.D.
 Warren E. Johnston, Ph.D.
 Alexander F. McCalla, Ph.D.



Lecturer:

- Alice R. Taylor, LL.B. (*Business Law*)

Department Major Advisers.—See *Schedule and Directory Listing*.

Bachelor of Science Major Program and Graduate Study. See pages 81 and 133.

* Absent on leave, fall quarter 1968.

Lower Division Courses

1. Economic Basis of the Agricultural Industry. (3) II.

Lecture—3 hours. Prerequisite: Economics 1A. Brief history of agriculture and man; the agricultural industry and its relation to the U.S. and world economies; production and supply, marketing and demand for agricultural products. Mr. McCorkle

2. Economic Basis of the Agricultural Industry. (3) III.

Lecture—3 hours. Prerequisite: course 1. Nature of agricultural land, capital, and labor markets; economic and social problems of agriculture in an urban and industrialized economy, particularly those relevant to California. Mr. Snyder

18. Business Law. (4) I.

Lecture—4 hours. Prerequisite: sophomore standing. Not open to students with credit for Business Administration 18. Introduction to law; contracts, sales, and agency. Mrs. Taylor

49. Field Practice. (1) II.

Field trip during Spring recess to observe aspects of the production, processing, handling, and distribution of agricultural products. Mr. Sosnick

Upper Division Courses

100A. Economic Analysis in Agriculture. (3) I.

Lecture—3 hours. Prerequisite: Economics 1A, 1B; Mathematics 16A (may be taken concurrently). 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.

Mr. Faris

100B. Economic Analysis in Agriculture. (3) II.

Lecture—3 hours. Prerequisite: course 100A. Pricing, output determination, and employment of resources under conditions of monopoly, oligopoly, and monopolistic competition.

Mr. McCalla

100C. Economic Analysis in Agriculture. (3) III.

Lecture—3 hours. Prerequisite: course 100B. Theory of regional specialization, location, and trade for agricultural products; general economic equilibrium.

Mr. Logan

106A. Quantitative Methods in Agricultural Economics. (3) II.

Lecture—3 hours. Prerequisite: Mathematics 13 or equivalent. Statistical methods for analyzing quantitative agricultural economics data: descriptive statistics, probability, hypothesis testing, statistical inference, and sampling.

Mr. Logan

106B. Quantitative Methods in Agricultural Economics. (3) III.

Lecture—3 hours. Prerequisite: course 106A or equivalent. Statistical methods for analyzing quantitative agricultural economics data: linear and multiple correlation and regression analysis.

Mr. Foytik

112. Fundamentals of Business Organization and Management. (3) I.

Lecture—3 hours. Principles and practices of organization and management; nature and structure of business; functions and operations; management tools; decision-making processes; taxation.

Mr. DeLoach

113. Cooperative Organization and Management. (3) II.

Lecture—3 hours. Scope and objectives of agricultural cooperation; management and operating policies and practices; legal, political, and social aspects.

Mr. Carman

114. Production Management. (3) III.

Lecture—3 hours. Principles and procedures for efficient use of resources in production; production scheduling; materials purchasing and handling; methods analysis; plant layout; and job evaluation.

Mr. Carman

***116. Financial Organization and Management. (4) II.**

Lecture—3 hours; discussion—1 hour. Recommended: course 112. Principles of credit;

* Not to be given, 1968-69.

capital needs of agricultural industries; agencies; government credit policy. Occasional field trips.

Mr. Carter

117. Managerial Accounting. (4) III.

Lecture—4 hours. Prerequisite: Economics 11A-11B; course 112 recommended. Basic concepts of accounting as a managerial tool; procedures for financial reporting; systems and internal control; cost accounting; budgeting; interpretation of administrative reports.

Mr. Hedges

120. Agricultural Policy. (3) I.

Lecture—3 hours. Analytical treatment of recent and current economic problems and governmental policies and programs affecting American agriculture.

Mr. Johnston

125. Comparative Agriculture. (4) II.

Lecture—4 hours. The agriculture of the principal countries of the world, with special reference to the influence of food supply upon the development of man.

Mr. Hedges

130. Agricultural Marketing. (4) I.

Lecture—4 hours. The nature, function, organizational structure, and operation of agricultural markets; prices, costs, and margins; market information, regulation, and controls; cooperative marketing.

Mr. French

140. Farm Management. (5) III.

Lecture—4 hours; laboratory—2 hours. Farm organization and resources; economic and technological principles in decision making; analytical techniques and management control; problems in organizing and managing the farm business.

Mr. Carter

145. Farm and Rural Resources Appraisal. (3) I.

Lecture—3 hours. Principles of farm and ranch appraisal; land utilization in relation to problems of development and valuation. One field trip is required.

Mr. Johnston

148. Economic Planning for Regional and Resource Development. (3) II.

Lecture—3 hours. Relation of resources to economic growth, including regional problems; planning economic development with particular emphasis on resource used in agriculture; selected resource development programs in the United States and certain foreign countries, including land reform experiences.

Mr. Dean

155. Quantitative Analysis for Business Decisions. (3) I.

Lecture—3 hours. Prerequisite: course 106A; Mathematics 16A. Introduction to selected topics in operations research, including mathematical programming, applied decision theory, game theory, and inventory models.

Mr. Foytik

160. Advanced Agricultural Marketing. (3) III.

Lecture—3 hours. Recommended: course 155. The marketing firm in its economic context; market structures; pricing and price policies; empirical demand analysis; marketing cost and efficiency; public policies toward marketing.

Mr. King

170. Advanced Farm Management. (3) II.

Lecture—3 hours. Prerequisite: course 155 or equivalent. The farm firm in its economic context; resource and enterprise combinations; size of firm; uncertainty considerations; replacement policies; demand for inputs; nonfarm influences.

Mr. Faris

176. Economic Analysis in Resource Use. (3) III.

Lecture—3 hours. An 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. Mr. Johnston

190A–190B. Senior Research Project. (2–2)

I-II, II-III.

Supervised individual research. The research report begun in 190A will be revised and completed in 190B.

Mr. Snyder, Mr. Sosnick

198. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of instructor. The Staff

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

Prerequisite: senior standing and approval of department. Limited to majors in agricultural economics with a B average or higher.

The Staff

Graduate Courses**200A–200B–200C. Economics of Agricultural Production, Consumption and Trade.**

(3–3–3) I-II-III.

Lecture—3 hours. Theory of the firm and industry, with particular reference to production; market structures, single and multiple products, uncertainty; theory of demand and consumption; and location theory and interregional trade.

I. Mr. French; II. Mr. King; III. Mr. Sosnick

210. Econometric Methods. (4) III.

Lecture—4 hours. Prerequisite: Mathematics 131B. Statistical models and their use in estimation of economic relationships; single and multiple equation systems.

220A–220B. Agricultural Policy. (3–3) I-II.

Lecture—3 hours. An appraisal, using criteria of social welfare and economic efficiency, of economic policy for agriculture in developed and developing nations; its place in general national and international economic policy under changing politico-economic conditions.

Mr. McCalla

250. Institutional Setting for Agricultural Business. (3) I.

Lecture—3 hours. Study of economic and social influences of the institutional environment on agriculture-related industries; historical development and present structure of the American economy; governmental activities; financial aspects; labor problems.

Mr. DeLoach

253A–253B. Quantitative Analysis of Operational Problems. (3–3) I-II.

Lecture—3 hours. Selected topics in operations research, including mathematical programming, decision theory, inventory, waiting line, and replacement models; simulation of business operations; statistical quality control.

I. Mr. Carter; II. Mr. Faris

257. Production Planning and Market Analysis. (3) III.

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.

Mr. Carman

260. Administrative Organization and Policy Formation. (3) III.

Lecture—3 hours. Concepts and techniques of administration in the business firm; formulation and implementation of management goals; planning, procuring, organizing, and controlling physical factors and personnel.

Mr. Foytik

280A–280B–280C. Analysis of Research in the Economics of Agriculture. (3–3–3) I-II-III.

Lecture—3 hours. Current research problems and methods of analysis in agricultural economics. A comprehensive approach to economic problems of agriculture, including analysis of production, supply, and demand for firm and industry; regional economics and interregional trade.

I. Mr. Dean; II. Mr. Logan; III. Mr. French

299. Individual Study. (1–4) I, II, III.

The Staff

299D. Special Study for Doctoral Dissertation.

(1–12) I, II, III.

The Staff

AGRICULTURAL ENGINEERING—See also Engineering: Agricultural AGRICULTURAL ENGINEERING

Coby Lorenzen, Jr., M.S., *Chairman of the Department*
Department Office, 2030 Engineering I

Professors:

Norman B. Akesson, M.S.
Roy Bainer, M.S. (*Agricultural Engineering and Engineering*)
Kinsell L. Coulson, Ph.D.
John R. Goss, M.S.
Samuel A. Hart, Ph.D.
S. Milton Henderson, M.S.
Clarence F. Kelly, M.S., Sc.D.
Robert A. Kepner, B.S.
Coby Lorenzen, Jr., M.S.
Loren W. Neubauer, Ph.D.
Michael O'Brien, Ph.D.
Herbert B. Schultz, Ph.D. (*Agricultural Engineering and Lecturer in Geography*)
Wesley E. Yates, M.S.

Associate Professors:

¹William J. Chancellor, Ph.D.
Robert B. Fridley, M.S.
John C. Harper, D.Sc.

Assistant Professors:

Stanton R. Morrison, Ph.D.
Leonard O. Myrup, Ph.D.



Lecturers:

²John B. Dobie, M.S.
¹Roger E. Garrett, M.S.
¹Joe P. Gentry, M.S.

Bachelor of Science Major Program and Graduate Study (College of Engineering).
See pages 81 and 133.

Lower Division Course

12. Engineering in Agricultural Operations. (3) II.

Lecture—3 hours. Introduction of engineering principles to tillage, harvesting, application of power, utilization of heat, materials handling, processing, structures, environment control, and systems concept. Mr. Lorenzen, Mr. Dobie

Upper Division Courses

103. Agricultural Power. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Physics 2A-2B or 4A-4B; open to qualified lower division students with consent of

¹ Absent on leave, 1968-69.

² Absent on leave, fall quarter 1968.

instructor. Principles of operation, construction, and utilization of internal-combustion engines; tractors and electric motors. Mr. Lorenzen

104. Agricultural Machinery. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Physics 2A or 4A. Principles of construction, operation, selection, and utilization of equipment for tillage, planting, harvesting, and the application of agricultural chemicals.

Mr. Yates

105. Farm Structures. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Physics 2A or 4A. Functional and structural design of unified physical plants for livestock production and other enterprises; principles of feed mills, materials conveying, water and electrical systems, feed storage; labor-efficiency studies; materials for and design of beams, columns, trusses, and tanks.

Mr. Neubauer

106. Micrometeorology in Agriculture. (3) II.

Lecture—3 hours. Prerequisite: Mathematics 16B or equivalent. Solar and terrestrial radiation; temperature and moisture fields near the surface; momentum and turbulent transfers; energy balance near the surface; practical applications to agriculture and air pollution.

Mr. Coulson

107. Agricultural Meteorology. (3) I.

Lecture—3 hours. Prerequisite: Geography 1 or 3. Daytime radiation intensities, nocturnal heat losses, climatic elements over different ground cover and terrain. Modification of microclimate by sheltering, frost-protection devices, and windbreaks. Probabilities of temperatures, rainfall, and climatic hazards to agriculture (risk figures). Mr. Schultz

110. Principles of Application of Agricultural Chemicals. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 13, Physics 2A-2B (or consent of instructor). Principles of fluid flow and atomization in relation to formulations and machine applications. Small particle behavior, micro-weather, chemical drift. Analysis of ground machines and aircraft systems for application of defoliants, fertilizers, pesticides and trace chemicals. Metering and calibration. Economics. Mr. Akesson

140. Atmospheric Turbulence. (3) III.

Lecture—3 hours. Prerequisite: Atmospheric Science 121. Basic theory of atmospheric turbulence, observed characteristics of turbulence, eddy transports of mass, momentum, and thermal energy, effects of turbulence in diffusion processes in the atmosphere. Mr. Myrup

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of the instructor.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses

245. Agricultural Waste Management. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Agricultural Engineering 125, Civil Engineering 148. The wastes problem peculiar to agriculture; types of rural and agricultural wastes, quantities and characteristics; practices and procedures for wastes management; co-ordination of agricultural wastes handling activities with that of all the community. Mr. Hart

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-6) I, II, III.

The Staff

AGRICULTURAL PRACTICES

Harry O. Walker, Ed.D., *Chairman of the Department*

Department Office, 2 TB-6

Lecturer:

Harry O. Walker, Ed.D.

Assistant Supervisors:

George F. Hanna, B.S.

Gene E. Rapp, M.Ed.

Professional Courses

314A. Agricultural Engineering Problems and Techniques for Teachers. (3) II.

Laboratory—9 hours. Prerequisite: Agricultural Education major or consent of instructor. The application of engineering and mechanical principles to the construction, maintenance, and repair of agricultural structures, machinery, and utilities. Offered in even-numbered years.

Mr. O'Brien

314B. Agricultural Engineering Problems and Techniques for Teaching. (3) II.

Laboratory—9 hours. Prerequisite: Agricultural Education major or consent of instructor. The application of engineering and mechanical principles to the construction, maintenance, and repair of agricultural structures, machinery, and utilities. Offered in odd-numbered years.

Mr. O'Brien

317. Problems in Teaching Farm Mechanics. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: 12 units in Agricultural Engineering including courses 314A, 314B; Physics 2A-2B or 4A-4B. Demonstrations of and practice in the methods of teaching farm mechanics in secondary schools. School-shop planning including the selection, arrangement, and management of equipment. Curriculum planning, including the relation of teaching materials, references, and visual aids.

Mr. O'Brien

AGRICULTURAL SCIENCE AND MANAGEMENT

William C. Weir, *Chairman of the Committee*
Committee Office, 162 Animal Science

Committee in Charge:

Walter L. Dunkley, Ph.D. (*Food Science and Technology*)

G. Eric Bradford, Ph.D. (*Animal Science*)

Daniel B. DeLoach, Ph.D., D.Lit.
(*Agricultural Economics*)

Lower Division Course

**49. Field Practice in Agriculture.
(No credit) I, II, III.**

Laboratory—3 hours. Prerequisite: consent of instructor. Operation and maintenance of tractors and specialized equipment used for producing and harvesting food and forage crops; familiarization with basic soil, water, and land management techniques. For students planning careers in production, processing, distribution, or service elements of the agricultural industry.

The Staff

William J. Flocker, Ph.D. (*Vegetable Crops*)

Harry O. Walker, Ed.D. (*Agricultural Practices*)

William C. Weir, Ph.D. (*Animal Science*)
Lynn D. Whittig, Ph.D. (*Soils and Plant Nutrition*)

Major Advisers.—See *Schedule and Directory Listing*.

Bachelor of Science Major Program and Graduate Study. See pages 81 and 133.

Lower Division Course

11. Natural and Social Sciences in Agriculture (Summer Laboratory). (1).

Lecture—2 hours. A survey of major activities of the departments in the College of Agricultural and Environmental Sciences and tours of departmental facilities. Contributions of the natural, physical, and social sciences to agricultural research, education, and management. The importance of agriculture to our society and the opportunities it has to offer. Mr. Nielsen

Upper Division Courses

198. Directed Group Study. (1-5) I, II, III.

Discussion—1-5 hours. Prerequisite: senior standing. Selected topics relating to application of science and management techniques to problems of the agricultural industry.

The Staff (Mr. Weir in charge)

Graduate Course

290. Seminar. (1) I.

Seminar—1 hour.

The Staff (Mr. Meyer in charge)

Agricultural Economics

Lower Division Courses

1. Economic Basis of the Agricultural Industry. (3) II.

Lecture—3 hours. Prerequisite: Economics 1A. Brief history of agriculture and man; the agricultural industry and its relation to the U. S. and world economies; production and supply, marketing and demand for agricultural products.

Mr. McCorkle

2. Economic Basis of the Agricultural Industry. (3) III.

Lecture—3 hours. Prerequisite: course 1. Nature of agricultural land, capital and labor markets; economic and social problems of agriculture in an urban and industrialized economy, particularly those relevant to California.

Mr. Snyder

Animal Science

Lower Division Courses

1. Domestic Animals and Man. (3) I.

Lecture—2 hours; laboratory—2 hours. Animal domestication and factors affecting their characteristics and distribution. Animal use by man for food, work, fiber, drugs, research and recreation; projected effects of population expansion and urbanization. Demonstrations of beef and dairy cattle, poultry, sheep, swine and horses.

The Staff (Mr. Weir in charge)

2. Introductory Animal Science. (3) III.

Lecture—2 hours; laboratory—2 hours. Recommended: course 1; Biology 1. Growth, reproduction, lactation, inheritance, nutrition, and disease control in domesticated animals; the application of sciences to animal production.

The Staff (Mr. Bradford in charge)

Plant Science

Lower Division Courses

1. Plants and Man. (3) II.

Lecture—3 hours. Plants as a basic resource for food, fiber, shelter, and recreation; their use and effect on man, past, present, and future.

Mr. Harris, Mr. Smeltzer

2. Production of Cultivated Plants. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 1. Principles of crop improvement, propagation, production, processing, storage, and marketing; conservation and utilization of land and water resources.

Mr. Flocker, Mr. Lider

Soil and Water Science

Lower Division Courses

1. Soil, Water, and Air Resources. (3) I.

Lecture—3 hours. Prerequisite: Biology 1 or consent of instructor. Interrelationships of man and environmental factors; utilization and development of renewable natural resources; characteristics of soil, water, and air and their relation to management and planning concepts. Open to non-majors.

Mr. D. Henderson

2. Soil, Water, and Air Resources. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisites: course 1; Biology 1; recommended: Physics 2A. Development and properties of soils; source and properties of water; properties of the atmosphere; soil, water, and air management in relation to crop production; planning concepts related to agricultural development and production.

Mr. Munns

Food Science and Technology

Upper Division Course

100. Processing Agricultural Products. (5) I.

Lecture—4 hours; laboratory—3 hours. Prerequisites: Biology 1; Chemistry 8B. Processing of foods, feeds, and fibers to provide desirable qualities such as convenience, economy and utility. Principles used in raw product selection, conversion, preservation, and quality control.

Mr. Miller, Mr. Dunkley

AGRICULTURAL TOXICOLOGY

Donald G. Crosby, Ph.D. *Chairman of the Committee*

Department Office, 109 Agricultural Toxicology Building

Committee in Charge:

Donald G. Crosby, Ph.D. (*Food Science and Technology*)

Wendell W. Kilgore, Ph.D. (*Food Science and Technology*)

Robert F. Norris, Ph.D. (*Agricultural Botany*)

Eugene M. Stafford, Ph.D. (*Entomology*)

George F. Stewart, Ph.D. (*Food Science and Technology*)

Norman E. Walker, Ph.D. (*Agricultural Toxicology*)

Upper Division Course

180. Agricultural Toxicology. (3) I.

Lecture—3 hours. Prerequisite: Chemistry 8B or 112B; Biochemistry 101A recommended. A unified introduction to the principles of agricultural toxicology. Pesticides, food additives, natural toxicants; their legal, commercial, and health significance.

Mr. Beckman, Mr. Crosby, Mr. Kilgore

Graduate Courses

203. Chemistry of Toxicants. (3) II.

Lecture—3 hours. Prerequisite: Chemistry 112B (or equivalent), or Chemistry 8B and con-

sent of instructor. Toxic substances: selected topics illustrating their occurrence, structure, and reactions indicative of metabolism and environmental transformations. Mr. Crosby

214. Mechanisms of Toxic Action. (3) II.

Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B and consent of instructor. Biochemical and physiological mechanisms underlying toxicity and detoxification. Mr. Kilgore

220. Analysis of Toxicants. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Chemistry 5 or 7B, Chemistry 9 or 112B; course 180 recommended. Principles of the chemistry of toxicants as applied to microanalytical techniques, theoretical considerations regarding sampling, sample processing, cleanup and isolation techniques and detection systems. Mr. Beckman

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff

298. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Topics such as trace analysis of toxicants, natural toxicants, and new pesticides.

The Staff (Mr. Crosby in charge)

299. Research. (1-12) I, II, III.

The Staff

AGRONOMY—See Plant Sciences

AMERICAN HISTORY AND LITERATURE

Paul Goodman, Ph.D., *Chairman of the Committee*

Committee Office, 222 Sproul Hall

Committee in Charge:

Professors:

Joseph A. Baird, Jr., Ph.D. (*Art*)

James J. Murphy, Ph.D. (*History*)

Associate Professors:

¹Paul Goodman, Ph.D. (*History*)

John R. Owens, Ph.D. (*Political Science*)

²Daniel E. Snyder (*Dramatic Art*)

Assistant Professor:

Robert H. Hopkins, Ph.D. (*English*)

Group Major Adviser.—Mr. Goodman.

The Major with Honors.—See description, page 113.

Major Adviser.—See *Schedule and Directory Listing*.

The subject matter of this major is confined to materials within the history and literature of the United States. Its focus is upon that area of investigation where the departments of English and History share a common interest in method and interpretation. Literary texts are subjected to a descriptive, analytical, and evaluative examination within the intellectual and cultural context of the history of the United States.

Preparation for the Major.—Required: History 17A, 17B, and English 30A, 30B, 30C. In addition, History 4A, 4B, 4C is required for students electing History in Group 3. Recommended: English 46A, 46B, 46C for those electing History in Group 3; History 4A, 4B, 4C for those electing literature in Group 3.

¹ Absent on leave, 1968-69.

² Absent on leave, fall quarter, 1968.

The Major Program.—A total of 52 units in upper division courses, distributed as follows:

Group 1. Sixteen units of history selected from the following courses: History 170A, 170B, 170C, 171A, 171B, 171C, 174A, 174B, 175A, 175B, 176A, 176B, 178A, 178B, 179A, 179B.

Group 2. Sixteen units of literature selected from the following courses: English 140, 141, 142, 143, 144, 146, 147, 152, 158A, 158B, 175; Dramatic Art 150.

Group 3. In consultation with his adviser, the student must select 20 additional units in either English or History. Those students who elect History in this group must take History 101A or 101B.

The Honors Program.—Students admitted to the honors program will take American History and Literature 194H and 197H in the senior year. These courses will count in Group 3.

Teaching Major.—Elementary and Secondary Credentials.

Subject Representative: Mr. Jacobson

ANATOMY

Walter S. Tyler, D.V.M., Ph.D., *Chairman of the Department*

Department Office, 1042 Haring Hall

Professors:

Logan M. Julian, D.V.M., Ph.D.

Walter S. Tyler, D.V.M., Ph.D.

Associate Professor:

Larry Z. McFarland, D.V.M., Ph.D.

Assistant Professors:

Raymond D. Barnes, Ph.D.

Leslie J. Faulkin, Jr., Ph.D.

Benjamin L. Hart, D.V.M., Ph.D.



Senior Lecturer:

Ida G. Schmidt, Ph.D.

Lecturer:

Marjan Merala, Ldo.Vet., M.S. (*Medical Bibliography*)

Upper Division Courses

100. Systematic Anatomy. (3) II.

Lecture—3 hours. Prerequisite: Zoology 2 and consent of instructor; course 100L (should be taken concurrently). Lectures emphasizing the typical structure of the major anatomical systems of the ruminant, carnivore, fowl, and primate. Offered in even-numbered years.

The Staff (Mr. McFarland in charge)

Teaching Major.—Requirements are the same as for the departmental major. There is no teaching minor in American History and Literature.

Upper Division Courses

194H. Special Study for Honors Students.

(4) I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: enrollment limited to honors students in American History and Literature. The Staff

197H. Special Study for the Comprehensive Examination for Honors Students.

(4) I, II, III.

Prerequisite: completion of all other major requirements for the A.B. degree in American History and Literature. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

100L. Systematic Anatomy Dissection. (5) II.

Laboratory—15 hours. Prerequisite: course 100 (should be taken concurrently). Dissection and demonstration of the major anatomical systems of the sheep, dog, chicken, monkey; and man, with comparisons to related species. Offered in even-numbered years. The Staff (Mr. McFarland in charge)

110. Ultramicroscopic Anatomy. (3) I.

Lecture—3 hours. Prerequisite: Zoology 107. The electron microscopic appearance of cells, tissues, and organs of animals emphasizing the structural basis for their physiological functions. Offered in even-numbered years.

Mr. Tyler, Mr. McFarland, Mr. Faulkin

140. Neuroanatomy of Domestic Animals. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: freshman standing in School of Veterinary Medicine. A functional, comparative consideration of gross, subgross and microscopic anatomy of the central nervous system and special senses of common domestic animals.

Mr. Hart

150. Functional Comparative Anatomy of the Locomotor System of Domestic Animals. (2) I.

Lecture—2 hours. Prerequisite: freshman standing in School of Veterinary Medicine, or Zoology 100 and consent of instructor. Gross, subgross, light microscopic and electronmicroscopic anatomy of the locomotor systems of domesticated mammals. Mr. Julian, Mrs. Schmidt

151. Functional Comparative Anatomy of the Locomotor System of Domestic Animals. (4) I.

Laboratory—12 hours. Prerequisite: course 150 (should be taken concurrently). Dissection of the locomotor system. Microscopic anatomy of the basic tissue types as represented in the locomotor system. Mr. Julian and Mrs. Schmidt

155. Functional Comparative Anatomy of Internal Organ Systems: Lecture. (2) II.

Lecture—2 hours. Prerequisite: freshman standing in School of Veterinary Medicine, or embryology and consent of instructors. Functional comparative gross, subgross, light microscopic, and electronmicroscopic anatomy of the organs in the abdomen and thorax.

Mr. Tyler, Mrs. Schmidt, Mr. Faulkin

156. Functional Comparative Anatomy of Internal Organ Systems: Gross Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 155 (to be taken concurrently). Dissection and demonstration of organ systems in abdomen and thorax. Mr. Tyler, Mrs. Schmidt, Mr. Faulkin

157. Functional Comparative Anatomy of Internal Organ Systems: Microscopic Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 155 (to be taken concurrently). Laboratory study and demonstration of microscopic and submicroscopic structure of organs of abdomen and thorax.

Mr. Faulkin, Mrs. Schmidt, Mr. Tyler

160. Functional Comparative Anatomy of Poultry and Experimental Animals: Lecture. (2) III.

Lecture—2 hours. Prerequisite: course 155 or consent of instructor. The gross, subgross, microscopic, and submicroscopic anatomy of poultry and conventional laboratory mammals.

Mr. Barnes, Mr. Julian

161. Functional Comparative Anatomy of Poultry and Experimental Animals: Laboratory. (1) III.

Laboratory—3 hours. Prerequisite: course 160 (should be taken concurrently). Dissection and demonstration of the gross and microscopic anatomy of poultry and conventional laboratory mammals.

Mr. Barnes, Mr. Julian

170. Principles of Normal and Abnormal Animal Behavior. (3) III.

Lecture—3 hours. Prerequisite: course 150 and Physiological Sciences 140B or consent of instructor. An examination of normal behavioral patterns of domestic animals with emphasis on the historical, environmental, and organismic determinants of behavior. An analysis of factors contributing to abnormal behavior in domestic animals.

Mr. Hart

180. Surgical Anatomy. (4) III.

Laboratory—12 hours. Prerequisite: second-year standing in the School of Veterinary Medicine. Topographical, radiological, and regional anatomy as applied to the clinical sciences.

Mr. McFarland

198. Directed Group Study. (2-5) I, II, III.

Laboratory—6-15 hours. Prerequisite: consent of instructor. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Laboratory—3-15 hours. Prerequisite: consent of instructor. The Staff

Graduate Courses

200. Functional Comparative Neuroanatomy. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: one of the following—course 100, 100L; Animal Science: Physiology 110A-110B, 120A; Anthropology 155; Psychology 108; Zoology 106A, 106B, 107, or the equivalent. A comparative gross and microscopic study of the nervous system of mammals and birds, with strong emphasis on function.

Mr. Hart, Mr. McFarland

202. Organology. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 157, and consent of instructor. The comparative development, growth patterns, and composition of selected animal organs: liver, kidney, lung, brain, a viscera and a skeletal muscle. Offered in odd-numbered years.

The Staff (Mr. Julian in charge)

204. Functional Comparative Anatomy of the Reproductive Systems. (3) I.

Lecture—3 hours. Gross, microscopic, and ultramicroscopic structure of the male and female reproductive systems in birds and mammals. Offered in odd-numbered years.

Mr. McFarland, Mr. Faulkin

210. Principles of Histochemistry. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Zoology 107, Biochemistry 101A. Principles of enzyme histochemistry of animal tissues applicable to light and electron microscopy. Offered in odd-numbered years.

Mr. Tyler

217. Experimental Endocrinology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Animal Science: Physiology 130. Gross, microscopic, and ultramicroscopic structure of the endocrine organs, and the applications of basic techniques used to demonstrate the physiological effects of these organs. Offered in even-numbered years.

Mr. Faulkin, Mr. McFarland

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff

297. Advanced Group Study in Surgical

Anatomy. (2-4) I, II, III.

Laboratory—6-12 hours. Prerequisite: course 180. Selected topics in topographical, radiological, or regional anatomy as they apply to the clinical sciences.

Mr. McFarland

298. Advanced Group Study. (2-5) I, II, III.

Laboratory—6-15 hours. Prerequisite: consent of instructor.

The Staff

299. Research (2-12) I, II, III.

Laboratory—6-36 hours. Prerequisite: consent of instructor.

The Staff

ANIMAL HUSBANDRY—See Animal Sciences

ANIMAL SCIENCES

Magnar Ronning, Ph.D., *Chairman of the Committee*

Committee Office, 234 Animal Science Building

Committee in Charge:

G. Eric Bradford, Ph.D. (*Animal Science*)

Hubert Heitman, Jr., Ph. D. (*Animal Science*)

Fredric W. Hill, Ph.D. (*Nutrition*)

Frederick W. Lorenz, Ph.D. (*Animal Physiology*)

Magnar Ronning, Ph.D. (*Animal Science and Nutrition*)

Wilbor O. Wilson, Ph.D. (*Poultry Husbandry*)

Participating Departments:

ANIMAL SCIENCE

Magnar Ronning, Ph.D., *Chairman of the Department*

Department Office, 234 Animal Science Building

Professors:

James M. Boda, Ph.D. (*Animal Science and Animal Physiology*)

Floyd D. Carroll, Ph.D.

Harold H. Cole, Ph.D. (*Emeritus*)

Perry T. Cupps, Ph.D. (*Animal Science and Animal Physiology*)

Irving I. Geschwind, Ph.D.

Harold Goss, Ph.D. (*Emeritus*)

Paul W. Gregory, Sc.D. (*Emeritus*)

Hubert Heitman, Jr., Ph.D.

Carroll E. Howell, M.S. (*Emeritus*)

Max Kleiber, LLD. Sc. D. (*Emeritus*)

Robert C. Laben, Ph.D.

Glen P. Lofgreen, Ph.D.

Sylvester W. Mead, M.S. (*Emeritus*)

James H. Meyer, Ph.D.

Wade C. Rollins, Ph.D.

William C. Weir, Ph.D.

James F. Wilson, M.A., LL.D. (*Emeritus*)

Associate Professors:

Ransom L. Baldwin, Jr., Ph.D.

G. Eric Bradford, Ph.D.

William N. Garrett, Ph.D.

Magnar Ronning, Ph.D. (*Animal Science and Nutrition*)

Assistant Professor:

Graham A. E. Gall, Ph.D.

◇ ◇ ◇

Assistant Professor:

David W. Robinson, Ph.D. (*Visiting*)

Lecturer:

Verne E. Mendel, Ph.D.

ANIMAL PHYSIOLOGY

Frederick W. Lorenz, Ph.D., *Chairman of the Department*

Department Office, TB 30

Professors:

James M. Boda, Ph.D. (*Animal Physiology and Animal Science*)

Perry T. Cupps, Ph.D. (*Animal Physiology and Animal Science*)

Frederick W. Lorenz, Ph.D.

¹ Absent on leave, 1968-69.

Edward A. Rhode, Jr., D.V.M. (*Animal Physiology and Clinical Sciences*)
 Arthur H. Smith, Ph.D.
 Irving H. Wagman, Ph.D.

Associate Professors:

Ronald J. Baskin, Ph.D. (*Animal Physiology and Zoology*)
 Ray E. Burger, Ph.D. (*Animal Physiology and Poultry Husbandry*)
 Harry W. Colvin, Jr., Ph.D.
 Frank X. Ogasawara, Ph.D. (*Animal Physiology and Poultry Husbandry*)

Assistant Professors:

Barry W. Wilson, Ph.D. (*Animal Physiology and Poultry Husbandry*)

Dorothy E. Woolley, Ph.D.

◊ ◊ ◊

Associate Professor:

Victor W. Burns, Ph.D. (*Physiological Sciences*)

Assistant Professors:

David W. Deamer, Ph.D. (*Zoology*)
 John M. Horowitz, Jr., M.S. (*Acting*)
 Stanton R. Morrison, Ph.D. (*Agricultural Engineering*)

Lecturers:

Walter E. Howard, Ph.D.
 Verne E. Mendel, Ph.D. (*Animal Science*)
 Charles Winget, Ph.D.

NUTRITION

Fredric W. Hill, Ph.D., *Chairman of the Department*

Department Office, 231 Home Economics Building

Professors:

Fredric W. Hill, Ph.D.
 Lucille S. Hurley, Ph.D.
 Aloys L. Tappel, Ph.D. (*Nutrition and Food Science and Technology*)

Associate Professor:

Magnar Ronning, Ph.D. (*Nutrition and Animal Science*)

Associate Professor:

Richard A. Freedland, Ph.D. (*Physiological Sciences*)

Assistant Professors:

Betty E. Haskell, Ph.D.
 Frances J. Zeman, Ph.D.

Professor:

◊ ◊ ◊

Robert E. Hungate, Ph.D. (*Bacteriology*)

Assistant Professor:

Quinton R. Rogers, Ph.D. (*Physiological Sciences*)

Lecturers:

Rocco J. Della Rosa, Ph.D. (*Physiological Sciences*)

Marvin Goldman, Ph.D. (*Physiological Sciences*)

POULTRY HUSBANDRY

Wilbor O. Wilson, Ph.D., *Chairman of the Department*

Department Office, 109 Poultry Husbandry Building

Professors:

²Ursula H. Abbott, Ph.D.
 Hans Abplanalp, Ph.D.
 Vigfus S. Asmundson, Ph.D., LL.D.
 (Emeritus)
 C. Richard Grau, Ph.D.
 F. Howard Kratzer, Ph.D.
 Samuel Lepkovsky, Ph.D., LL.D. (*Emeritus, Berkeley Campus*)

Lewis W. Taylor, Ph.D. (*Emeritus*;

Berkeley Campus)

Wilbor O. Wilson, Ph.D.

Associate Professors:

Ray E. Burger, Ph.D. (*Poultry Husbandry and Animal Physiology*)
 Frank X. Ogasawara, Ph.D. (*Poultry Husbandry and Animal Physiology*)
 Daniel W. Peterson, Ph.D.

² Absent on leave, fall quarter 1968.

Assistant Professors:

Edward E. Kriekhaus, Ph.D.

Barry W. Wilson, Ph.D. (*Poultry Husbandry and Animal Physiology*)**Lecturers:**A. Wade Brant, Ph.D. (*Food Science and Technology*)

Leo C. Norris, Ph.D.

Pran Vohra, Ph.D.

Major Advisers.—See *Schedule and Directory* listing.**Bachelor of Science Major Program and Graduate Study.**—See pages 81 and 133.**Animal Science****Lower Division Courses****1. Domestic Animals and Man. (3) I.**

Lecture—2 hours; laboratory—2 hours. Animal domestication and factors affecting their characteristics and distribution. Animal use by man for food, work, fiber, drugs, research and recreation; projected effects of population expansion and urbanization. Demonstrations of beef and dairy cattle, poultry, sheep, swine and horses.

The Staff (Mr. Weir in charge)

2. Introductory Animal Science. (3) III.

Lecture—2 hours; laboratory—2 hours. Recommended: course 1; Biology 1. Growth, reproduction, lactation, inheritance, nutrition, and disease control in domesticated animals; the application of sciences to animal production.

The Staff (Mr. Bradford in charge)

10. Poultry Production. (4) II.

Lecture—4 hours. A survey of principles and practices involved in poultry production. Designed for students not specializing in avian sciences.

Mr. Ogasawara

11. Laboratory in Poultry Production. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 10 (may be taken concurrently) or consent of instructor. Laboratory studies in poultry biology; techniques and economics of poultry production.

Mr. Ogasawara

12. Survey of Poultry and Allied Industries. (3) II.

Lecture—2 hours; conference—1 hour. A survey of industries concerned with poultry products in the U. S. A. and various regions of the world: hatchery industry, feed industry, egg and meat production, poultry products, specialized enterprises.

Mr. Peterson

§ Not to be given, spring quarter 1969.

21. Livestock and Dairy Cattle Judging. (2) III.

Laboratory—6 hours. Prerequisite: courses 1 and 2. Conformation, finish, and quality in relation to ideal type. Relationship of form to function. Change in body proportions with growth and maturity. Correlation between types in live meat animals and carcass quality.

Mr. Cupps, Mr. Mendel

Upper Division Courses**111. Type Evaluation in Livestock and Dairy Cattle. (2) I.**

Laboratory—6 hours. Prerequisite: course 21. Studies of recognized type evaluation in livestock and dairy cattle. Critical evaluation of the bases for the criteria used in establishing these standards.

Mr. Carroll

114A-114B. Advanced Dairy Cattle Production.

(3-3) II-III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 110; Physiology 110B. The principles of milk production and sources of variation in milk yield and composition. Current knowledge in ruminant nutrition, feeds and feeding practices, breeding and genetics, milk secretion, reproductive physiology, and herd management considered in relation to production.

Mr. Laben

§115. Horse Production. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Genetics 100B; Nutrition 103 or 110; Physiology 110B. Feeding, breeding, and management of horses; application of the principles of basic animal sciences to problems of production of all classes of horses.

116A-116B. Meat Animal Production. (3-3) II-III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Animal Genetics 107; Nutrition 103 or 110; Physiology 110B. Application of the sciences of nutrition, physiology and genetics to the development of efficient management programs for beef, sheep, and swine production. Similarities and differences among these species affecting management practices. Methods of improving carcass and meat quality.

Mr. Bradford, Mr. Garrett

118. Meat and Dairy Production. (5) III.

Lecture—5 hours. Prerequisite: course 2; Genetics 100B; Nutrition 103 or 110. Improvement of meat and dairy production through selection for heritable traits; comparative reproductive and feed efficiency; environmental adaptability and distribution; management for efficient yield of meat and milk. Not open for credit to animal science majors.

Mr. Carroll

121. Poultry Products Technology. (3) I.

Lecture—3 hours. Prerequisite: consent of instructor. Physical, chemical, and nutritional com-

position of poultry products; quality criteria and standards; physical, chemical, and microbiological factors influencing keeping quality.

Mr. Peterson, Mr. Brant

149. Environmental Management of Domestic Animals. (1) III.

Discussion—1 hour. Prerequisite: Physiology 149 (may be taken concurrently). Application of physiological principles to environmental management of domestic animals. Mr. W. O. Wilson

190. Proseminar in Animal Science. (1) I, II, III.

Seminar—1 hour. Prerequisite: senior standing in Animal Science or consent of instructor. Reports and discussions of recent advances in animal science.

Mr. Heitman

194H. Special Study for Honors Students.

(1–5) I, II, III.

Prerequisite: open only to animal science majors who are honors students of senior standing. 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.

The Staff (Mr. Heitman in charge)

198. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of instructor. Selected topics relating to the animal (including avian) sciences.

The Staff (Mr. Heitman in charge)

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

Prerequisite: consent of instructor. Problems in animal (including avian) biology related to nutrition, breeding, and physiology of large domestic livestock and poultry and their products.

The Staff (Mr. Heitman in charge)

Graduate Courses

202. Experimental Incubation and Avian Teratology. (3) II.

Lecture—3 hours. Prerequisite: Chemistry 8B; Zoology 100; Zoology 107 recommended. Problems of embryonic development, causes of embryonic mortality and terata in poultry. Offered in odd-numbered years.

Mrs. Abbott

202L. Laboratory in Avian Experimental Embryology and Teratology. (3) II.

Laboratory—9 hours. Prerequisite: course 202 (may be taken concurrently). The 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 odd-numbered years.

Mrs. Abbott

290. Seminar. (1) I, II, III.

Seminar—1 hour. Reports and discussions of topics of interest in genetics, nutrition, and physiology as they apply to animal (including avian) husbandry. The Staff (Mr. Heitman in charge)

298. Group Study. (1–5) I, II, III.

Prerequisite: consent of instructor. Lectures and discussions of advanced topics in the animal (including avian) sciences.

The Staff (Mr. Heitman in charge)

299. Research. (1–12) I, II, III.

The Staff (Mr. Heitman in charge)

Animal Biochemistry

Upper Division Course

102. Animal Biochemistry Laboratory. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biochemistry 101B (may be taken concurrently). Laboratory procedures employed in the study of physiological and biochemical processes.

Mr. Ronning

Graduate Courses

201. Protein Biochemistry. (3) II.

Lecture—3 hours. Prerequisite: Biochemistry 201C. Introduction to the chemical, physical, and biological properties of amino acids, peptides, and proteins. The biological aspects include protein function, biosynthetic and biodegradative pathways, and nutritional requirements for amino acids.

Mr. Geschwind

230. Biochemical Aspects of Endocrinology. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101B; Physiology 110B. The chemistry and function of animal hormones, with special reference to the isolation and structure of those of vertebrate origin. Assay, mechanism of action, biosynthesis, and metabolism of hormones. Biochemical lesions in congenital and other endocrinopathies. Offered in odd-numbered years.

Mr. Geschwind

Animal Genetics

Upper Division Courses

107. Animal Breeding and Genetics. (3) I.

Lecture—3 hours. Prerequisite: Genetics 100B; Mathematics 13. Qualitative and quantitative inheritance in relation to animal breeding; review of selection and breeding experiments with reference to livestock and poultry improvement.

Mr. Abplanalp

107A. Animal Breeding Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 107. Laboratory exercises in quantitative genetics using *Drosophila*. Selection, inbreeding and line crossing experiments alternate with statistical analyses using the collected data.

Mr. Gall

107B. Animal Breeding Laboratory. (1) I.

Laboratory—3 hours. Prerequisite: course 107 (may be taken concurrently). Experiments on qualitative and quantitative genetics using the laboratory mouse: segregation; linkage; evaluation of effects of inbreeding and line crossing; maternal influence on different kinds of traits.

Mr. Bradford

107C. Discussion of Animal Breeding Experiments and Methods. (1) III.

Discussion—1 hour. Prerequisite: course 107. Review of literature and discussion relating to animal breeding experiments and programs. Emphasis on cattle, sheep and swine. Mr. Rollins

107D. Discussion of Poultry Breeding Experiments and Methods. (1) II.

Discussion—1 hour. Prerequisite: course 107. A discussion of genetic experiments and breeding plans specifically related to poultry.

Mr. Abplanalp

108. Methods in Quantitative Animal Breeding. (3) II.

Lecture—3 hours. Prerequisite: course 107. Principles, methods and procedures in quantitative animal breeding; heritability, intra- and inter-population selection methods, including selection index, family, pedigree and progeny selection; genetic correlation; relationship and inbreeding.

Mr. Rollins

108L. Animal Breeding Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 108 (may be taken concurrently). Estimation of heritabilities, genetic correlations and repeatabilities, calculation of inbreeding and relationship co-efficients, adjustment of data for environmental effects, construction of selection indexes, estimation of selection response and hybrid vigor.

Mr. Rollins

109. Developmental Genetics in Animals. (3) I.

Lecture—2 hours; discussion—1 hour. Prerequisite: Genetics 100B, Zoology 100. Gene and gene action in vertebrates; the gene in relation to genetic background and developmental environment.

Mrs. Abbott

Graduate Courses**207. Quantitative Genetics and Animal Breeding. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 105B; Mathematics 16A recommended. The genetic theory of selection, population structure, and induced variation, and its implications in the design of animal breeding experiments.

Mr. Abplanalp

299. Research. (1-12) I, II, III.

The Staff (Mr. Bradford in charge)

Nutrition**Lower Division Course****10. Discoveries and Concepts in Nutrition. (3) III.**

Lecture—3 hours. Nutrition as a science; its historical development; the properties of foods.

Mr. Hill

Upper Division Courses**103. Animal Nutrition and Feeding. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Chemistry 8B. The basic principles of animal nutrition as they are applied to livestock feeding; the composition and uses of feedstuffs in their relation to the feeding of farm animals and poultry; the balancing of rations. Not open for credit to animal science majors. Mr. Garrett

109. Nutritional Principles of Livestock Feeding. (3) I.

Lecture—3 hours. Prerequisite: second-year standing in School of Veterinary Medicine or consent of instructor. The principles of nutrition and their application to the solution of problems in animal feeding. Nutritive requirements for maintenance and productive functions, nutritional disorders, composition and use of feedstuffs.

110. Principles of Nutrition. (5) II.

Lecture—4 hours; discussion—1 hour. Prerequisite: Biochemistry 101B (may be taken concurrently); a course in physiology or zoology. The fundamental principles of the nutrition of man and other animals. The nutrients in relation to physiological processes of growth, maintenance, and reproduction. Nutritional disorders.

Mr. Robinson, Mr. Grau

111. Human Nutrition. (4) III.

Lecture—4 hours. Prerequisite: course 110. Nutrition of man; critical study of nutrient requirements at various phases of the life cycle.

Mrs. Hurley

111L. Nutrition Laboratory. (1) III.

Laboratory—3 hours. Prerequisite: course 110. Laboratory study of the chemical and physiological roles of nutrients in metabolism; use of experimental animals in determining the essentiality and function of nutrients.

Mrs. Hurley

112A-112B. Nutrition and Dietetics. (4-4) I-II.

Lecture—4 hours. Prerequisite: Chemistry 8B; Physiology 2 or 101. Introduction to the principles of nutrition; study of the nutrients and their chemical and physiological roles in metabolism; nutrient requirements of man.

113. Nutrition and Dietetics Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 112B should be taken concurrently. Laboratory study of the principles of nutrition; study of the nutrients and their chemical and physiological roles in metabolism.

114. Nutrition and Development. (4) I.

Lecture—4 hours. Prerequisite: course 110 or 112B. The role of nutritional factors in embryonic and postnatal development. Mrs. Hurley

116. Nutrition and Diet Therapy. (5) I.

Lecture—5 hours. Prerequisite: course 112B; Biochemistry 101B. Physiological basis for the use of special diets. Problems in the planning and computation of dietaries for normal and pathological conditions. Mrs. Haskell

117. Problems in Human Nutrition. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 112B; Biochemistry 101B; Chemistry 5. Evaluation of methods of assessing nutritional status in humans. Application of chemical, microbiological, chromatographic, and enzymatic techniques to current problems in human nutrition. Mrs. Haskell

121. Animal Nutrition Laboratory. (2) III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 110. Studies, demonstrations, and exercises in the measurement of nutritional values of feeds, nutrient requirements for physiological functions, and ration formulation. Students who have completed course 122 and/or 123 will have units of credit reduced by one unit per course.

122. Ruminant Nutrition. (3) III.

Lecture—3 hours. Prerequisite: course 110; Bacteriology 2; Physiology 110B. A study of nutrient utilization as influenced by the unique aspects of digestion and fermentation in the ruminant. Students who have completed course 121 may only receive 2 units of credit.

Mr. Ronning

123. Nutrition of Non-Ruminant Animals. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110. Application of nutrition principles to the feeding of non-ruminant species, including swine, poultry and laboratory animals. Students who have completed course 121 may only receive 2 units of credit.

Mr. Robinson, Mr. Kratzer

125. Metabolism and Food Utilization. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110; Physiology 110B. Bioenergetics; a study of energy expenditures of animals and of factors influencing the utilization of food energy.

Mr. Ronning

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to animal science majors who are honors students of senior standing. 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. The Staff (Mr. Hill in charge)

198. Directed Group Study. (1-5) I, II, III. The Staff**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III. The Staff

Graduate Courses**201A. Advanced General Nutrition. (3) I.**

Lecture—3 hours. Prerequisite: Bacteriology 2; Biochemistry 101B; Physiology 110B; a course in nutrition. Advanced studies of protein and amino acid metabolism; animal energetics and energy metabolism. Comparative aspects.

The Staff (Mr. Hill in charge)

201B. Advanced General Nutrition. (3) II.

Lecture—3 hours. Prerequisite: Bacteriology 2; Biochemistry 101B; Physiology 110B; a course in nutrition. Advanced studies of problems in nutrition with emphasis on minerals; water balance. Comparative aspects.

The Staff (Mr. Kratzer in charge)

201C. Advanced General Nutrition. (3) III.

Lecture—3 hours. Prerequisite: Bacteriology 2; Biochemistry 101B; Physiology 110B; a course in nutrition. Advanced studies of metabolic function and nutritional importance of vitamins; essential fatty acids; deficiency and degenerative diseases. Comparative aspects.

The Staff (Mrs. Hurley in charge)

***250. Concepts of Animal Nutrition. (3) II.**

Lecture—3 hours. Prerequisite: courses 201A, 201B, 201C. Dynamic interrelationships between food, animal, and environment, including concepts in food intake, digestion, absorption, and utilization of nutrients.

290. Seminar. (1) I, II, III.

Seminar—1 hour. Discussion and critical evaluation of advanced topics in nutrition research.

The Staff (Mr. Hill in charge)

298. Group Study. (1-5) I, II, III.

The Staff (Mr. Hill in charge)

299. Research. (1-12) I, II, III.

The Staff (Mr. Hill in charge)

Physiology**Upper Division Courses****100A-100B. General Physiology. (3-3) I-II.**

Lecture—3 hours. Prerequisite: Biology 1; Chemistry 8B; Physics 2C. Chemical, mathematical, and physical characteristics of the life process common to living things, with particular reference to the cell and its regulatory mechanisms.

Mr. Colvin

* Not to be given, 1968-69.



100L. General Physiology Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 100B (may be taken concurrently). Laboratory in the physical and chemical processes of cells and tissues. Mr. Colvin

101. Functions of Organ Systems. (4) III.

Lecture—4 hours. Prerequisite: Biology 1. Physiology of organ systems; concepts of integrative and homeostatic mechanisms, especially in adaptation, growth, and reproduction. Mr. Lorenz, Mrs. Woolley

101L. Organ Function Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 101 (should be taken concurrently). Dissections, primarily of domestic animals, and selected experiments to illustrate functional relationships. Mr. Lorenz, Mrs. Woolley

102. Physiology of Growth. (3) III.

Lecture—3 hours. Prerequisite: Bacteriology 2; Botany 2; Zoology 2; or courses 101, 101L. Recommended: course 100B; Biochemistry 101B; Mathematics 13. Biological, physical, and chemical aspects of the growth of organisms. Mr. Smith

103. Physiology of Animal Cells. (3) III.

Lecture—3 hours. Prerequisite: course 100B; Biochemistry 101B. Recommended: Bacteriology 130; Mathematics 16B; Zoology 121. Organization of metazoan systems at the cellular level; cell and tissue culture; tissue regulation; embryonic development. Mr. B. W. Wilson

104. Relationships of Form and Function. (3) II.

Lecture—3 hours. Prerequisite: courses 101 and 101L, or Zoology 2. Relationships between form and function of biological systems from the molecular to the animal levels as exemplified by the adaptations of birds and other animals. Mr. B. W. Wilson

107. Avian Physiology. (3) III.

Lecture—3 hours. Prerequisite: courses 101 and 101L, or Zoology 2. Physiology of the various systems of birds with emphasis on digestion, respiration, excretion, and the nervous system. Mr. Burger

107L. Avian Physiology Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 107 (may be taken concurrently); and consent of instructor. Selected problems in the physiology of birds. Mr. Burger

108. Biodynamics. (4) III.

Lecture—4 hours. Prerequisite: course 110B; Mathematics 16B; Physics 2C. Rates and dynamics of physiological processes. Mr. Morrison

110A–110B. Mammalian Physiology. (3–3) I–II.

Lecture—3 hours. Prerequisite: course 101 and 101L, or Zoology 2; Chemistry 8B. The

physiology of the neuromuscular, central nervous, circulatory, respiratory, digestive, endocrine, reproductive, and excretory systems of mammals.

Messrs. Horowitz, Boda, Mendel, Burger

111A–111B. Mammalian Physiology Laboratory.

(1–1) I–II.

Laboratory—3 hours. Prerequisite: course 110A–110B (may be taken concurrently).

Messrs. Horowitz, Boda, Mendel, Burger

120A. Comparative Physiology. (3) I.

Lecture—3 hours. Prerequisite: courses 101 and 101L. Comparisons of physiological functions in the animal kingdom: neural and humoral integrative mechanisms.

Mr. Lorenz, Mrs. Woolley

120B. Comparative Physiology. (3) II.

Lecture—3 hours. Prerequisite: course 101 and 101L. Comparisons of physiological functions in the animal kingdom: respiration and circulation.

Mr. Smith, Mr. Rhode

120C. Comparative Physiology. (3) III.

Lecture—3 hours. Prerequisite: course 101 and 101L. Comparisons of physiological functions in the animal kingdom: digestion and excretion.

Mr. Colvin, Mr. Boda

121. Physiology of Reproduction. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 110B. The physiological mechanisms related to reproduction, breeding efficiency, and fertility, with special reference to domestic animals.

Mr. Cupps

130. Physiology of the Endocrine Glands. (5) I.

Lecture—4 hours; discussion—1 hour. Prerequisite: course 110B. Control of endocrine secretion and the physiological effects of the hormones, with emphasis on endocrine problems relating to domestic animals.

149. Environmental Physiology of Domestic Animals. (3) III.

Lecture—3 hours. Prerequisite: courses 101 and 101L, or Zoology 2. The influences of environmental factors on physiological processes related to domestic animals. Mr. W. O. Wilson

194H. Special Study for Honors Students.

(1–5) I, II, III.

Prerequisite: open only to animal science or physiology majors who are honors students of senior standing. 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.

The Staff (Mr. Lorenz in charge)

198. Directed Group Study. (1–5) I, II, III.

The Staff (Mr. Lorenz in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Lorenz in charge)

Graduate Courses***200A. Advanced General Physiology. (3) I.**

Lecture—3 hours. Prerequisite: course 100B or Zoology 158, Biochemistry 101B and Chemistry 110B; or consent of instructor. Physicochemical bases of living systems with emphasis on recent investigations in membrane physiology. Offered in odd-numbered years.

Mr. Baskin, Mr. Deamer

***200B. Advanced General Physiology. (3) II.**

Lecture—3 hours. Prerequisite: course 100B or Zoology 158, Biochemistry 101B and Chemistry 110B; or consent of instructor. Physicochemical bases of living systems with emphasis on recent investigations in cellular dynamics. Offered in even-numbered years. Mr. B. W. Wilson

210. Advanced Systemic Physiology. (5) III.

Lecture—2 hours; laboratory—9 hours. Prerequisite: course 110B. Advanced treatment of systemic physiology, with special emphasis on current developments; laboratory exercises illustrating modern physiological concepts and procedures. The Staff (Mr. Horowitz in charge)

214. Neurophysiology. (4) II.

Lecture—4 hours. Prerequisite: courses 110B, 111B; course 100B recommended. Electrical activity of neurons and neuroeffector junctions; physiology of the nervous system as studied by its electrical activity. Mr. Wagman, Mr. Burger

215. Neurophysiology Laboratory. (6) II.

Discussion—2 hours; laboratory—12 hours. Prerequisite: course 214 taken concurrently.

Mr. Wagman, Mr. Burger

216. Neurophysiology Literature. (2) III.

Discussion—2 hours. Prerequisite: course 214. Critical reading and group discussion of current and classic original papers in neurophysiology. Mr. Wagman

220. General and Comparative Physiology of Reproduction. (3) I.

Lecture—3 hours. Prerequisite: course 110B; Biochemistry 101B; Genetics 100B. 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. Mr. Ogasawara, Mr. Cupps

***225. Physiology of Lactation. (3) III.**

Lecture—3 hours. Prerequisite: course 110B; Biochemistry 101B. The physiology and biochemistry of milk formation, with special reference to the metabolic pathways leading to the synthesis of milk in various species of mammals. Offered in even-numbered years. Mr. Baldwin

231. Selected Topics in Neuroendocrinology. (2) II.

Lecture—1 hour; discussion—1 hour. Prerequisite: course 120A or 130 or consent of instructor. Neural-endocrine interactions; neurosecretion; neural regulation of endocrine systems; hormonal modifications of neural development and activity. May be repeated once for credit.

Mrs. Woolley

242. Physiological Rhythmicity. (1) I.

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. Mr. Winget

251. Physiological Basis of Higher Nervous Function. (4) III.

Lecture—4 hours. Prerequisite: course 110A or Psychology 108, or consent of instructor. Relations between the structure and function of the brain and problems of emotion, motivation, and learned behavior. Mr. Kriegelhaus

290. Seminar. (1) I, II, III.

Seminar—1 hour. Discussion and critical evaluation of advanced topics and current trends in research. The Staff (Mr. Lorenz in charge)

291. Seminar in General Physiology. (1) III.

Seminar—1 hour. Discussion of selected topics concerning the physical and chemical processes of cells and tissues.

Mr. Colvin, Mr. Burns

298. Group Study. (1-5) I, II, III.

The Staff (Mr. Lorenz in charge)

299. Research. (1-12) I, II, III.

The Staff (Mr. Lorenz in charge)

* Not to be given, 1968-69.

ANTHROPOLOGY

Daniel J. Crowley, Ph.D., *Chairman of the Department*

Department Office, 331 Voorhies Hall

Professors:

Martin A. Baumhoff, Ph.D.

Daniel J. Crowley, Ph.D. (*Anthropology and Art*)

David L. Olmsted, Ph.D.

Assistant Professors:

Edwin A. Cook, Ph.D.

Donald G. Lindburg, Ph.D.

Melvin K. Neville, Ph.D.

Delbert L. True, Ph.D.

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Assistant Professors:

Kenne H-K Chang, M.A. (*Acting*)

William G. Davis, A.B. (*Acting*)

Lecturers:

Richard T. Curley, A.B.

Donald R. Vesper, M.A.

Departmental Major Advisers.—Mr. Neville, Mr. Davis, Mr. Curley.

The Major Program

Lower Division Courses.—Required: Anthropology 1, 2, 3, 13, and Geography 1.

Upper Division Courses.—Required: Anthropology 102, 103A, 110A, 110B, 110C or 120, 128A, 195 or equivalent; 4 units of physical anthropology; 4 units of ethnography; and 8 additional units selected from other upper division courses in anthropology, Art 150, Genetics 100B, or Genetics 115.

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.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—Required: 30 quarter units of anthropology.

Subject Representative: Mr. Neville

Lower Division Courses

1. Physical Anthropology. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Human biology and physical anthropology; the relation of man and the animals; the origin and antiquity of man; fossil man; anthropometry, the criteria of race and racial classification; current racial theories; race problems.

Mr. Neville, Mr. Lindburg

* Not to be given, 1968-69.

2. Cultural Anthropology. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Diversity of cultures considered from the aspects of language, economics, kinship, art, magic, and religion; culture change. Mr. Davis

3. Introduction to Archaeology. (4) I.

Lecture—3 hours; discussion—1 hour. Development of archaeology as an anthropological study; objectives and methods of modern archaeology; prehistory and growth of culture; the origins and early development of civilization in the Old and New World. Mr. True

13. Quantitative Method in Anthropology. (4) I.

Lecture—3 hours; discussion—1 hour. Mr. Baumhoff

Upper Division Courses

102. Ethnology. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of the instructor. Major theories of culture; survey of principal culture types and their distribution; discussion of ethnological problems. Mr. Curley

103A. Archaeological Theory and Method. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1, 3, and 13. Theory and method of prehistoric archaeology. Mr. True

103B. Old World Archaeology. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103A. Comparative prehistory and archaeology of the Eastern Hemisphere. Mr. Baumhoff

103C. New World Archaeology. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103A. Comparative prehistory and archaeology of the Western Hemisphere. Mr. True

***105A. Indians of North America. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of the instructor. An introductory survey of the Indians of North America: origins, languages, civilizations, and history.

***105B. The Indians of South America. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of the instructor. An introductory survey of the Indians of South America: origins, languages, civilizations, and history.

110A. Elementary Linguistic Analysis. (3) I.

Lecture—2 hours. Phonetics and phonemics. Mr. Olmsted

110B. Intermediate Linguistic Analysis. (3) II.

Lecture—2 hours. Prerequisite: course 110A. Morphophonemics, morphemics and tactics.
Mr. Olmsted

110C. Comparative Linguistics. (3) III.

Lecture—2 hours. Prerequisite: course 110B. Linguistic prehistory, historical linguistics and reconstruction; dialect geography. Mr. Olmsted

***119A. Culture and Personality. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of the instructor. Methods and theories in the study of the relationships among culture, society, and personality. The development of culture and personality as a subdiscipline in anthropology. Mr. Cook

***119B. Culture and Personality. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 119A. An examination of empirical investigations of preliterate and contemporary societies in relation to the techniques of culture and personality studies. Mr. Cook

120. Language and Culture. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 110B. Language and thought; classification of languages; linguistic aspects of culture; language, nation, and state. Mr. Cook

***121. Folklore. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or literary preparation acceptable to the instructor. Theory and method in the study of folktales, myths, legends, proverbs, riddles, songs, and other forms of verbal tradition. Mr. Crowley

122. Economic Anthropology. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of the instructor. Economic behavior in nonindustrial societies; its social and cultural setting, and its modern changes.

Mr. Davis

124. Comparative Religion. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of the instructor. An anthropological analysis of the origins, elements, forms, and symbolism of religion; functional interpretation with stress on ethnographic materials.

Mr. Curley

128A. Kinship and Social Organization. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. Theoretical: discussion of theories of social organization with primary emphasis on typology and classification of family and kinship systems.

Mr. Davis

***128B. Kinship and Social Organization. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 128A. Methodological: demon-

stration of field methods and discussion of analytic models. Primary emphasis will be placed on componential and transformational analysis.

***139. Peoples of Africa. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of the instructor. Peoples and cultures of Africa: survey and comparative analysis of representative societies and cultures in the area.

Mr. Crowley

140. Peoples of Afroamerica. (4) II.

Lecture—3 hours; discussion—1 hour. A study of the cultural implications of slavery and the contribution of Africans to the national cultures of the Americas.

Mr. Crowley

***143. Peoples of India. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of the instructor. Development of Indian cultural traditions; social organization and social trends.

147A. Peoples of the Pacific. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. The aboriginal cultures of Australia and Melanesia in prehistoric and modern times; changes arising from European contact and colonization.

Mr. Cook

147B. Peoples of the Pacific. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2. The aboriginal cultures of Polynesia and Micronesia in prehistoric and modern times; changes arising from European contact and civilization.

Mr. Cook

148. Ecological Anthropology. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of instructor. Survey of theories, methods, and applications of the ecological perspective to cultural and physical attributes of human populations.

Mr. Chang

151. Primate Evolution. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; Zoology 2 recommended. The origin and relationships of the prosimians, monkeys, and apes.

Mr. Neville

152. Human Evolution and Fossil Man. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. Nature and results of the evolutionary processes involved in the formation and differentiation of mankind.

Mr. Lindburg

***153. Living Races of Man. (4) III.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1. Physical characters, distribution, and relationships.

Mr. Neville

* Not to be given, 1968-69.

154. Primate Behavior and Ecology. (4) I.

Lectures—3 hours; discussion—1 hour. Prerequisite: course 1. The social behavior, organization, and ecology of monkeys and apes, their relevance to the evolution of human behavior and social groups. Mr. Neville

***155. Comparative Primate Anatomy. (4) II.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Zoology 2. The functional anatomy of the locomotor, digestive, reproductive, and nervous systems of monkeys and apes. Emphasis on the anatomical evidence for their interrelationships.

***160A. Contemporary Civilization. (4) II.**

Lecture—3 hours; discussion—1 hour. The application of anthropological concepts and methods to the study of contemporary civilization. Emphasis will be placed on the development and evolution of American culture from its beginnings to the present.

***160B. Contemporary Civilization. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 160A. An anthropological analysis of special problems in contemporary civilization, such as family and kinship organization, community organization, and political integrations. Comparisons of American culture with other societies in contemporary civilization.

162. Peasant Society and Culture. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: consent of the instructor. Comparative study of peasant communities, utilizing historical and ethnographic sources; analysis of urban rural relations; problems of economic development and culture change. Mr. Chang

165. Culture Change. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of the instructor. Introduction to the analysis of socio-cultural stability and change; theories of innovation, diffusion, acculturation, and cultural evolution; problems of social planning. Mr. Chang

190. Cultures of China and Korea. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of the instructor. Ethnological and comparative treatments of two cultures with emphasis on the village level. Mr. Chang

***191. Culture of Japan. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or consent of the instructor. Development of Japanese cultural traditions; social structure and social trends. Mr. Chang

192. Peoples and Cultures of Southeast Asia.

(4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2 or equivalent or consent of

the instructor. The development of major cultural traditions, the patterns of ecological relationships, and comparative social organization of ethnic and regional groups in Southeast Asia.

Mr. Davis

†195. Field Course in Archaeological Method.

(3) I, III.

Laboratory—8 hours. Prerequisite: course 3. Lectures, museum preparation, and weekend excavations. Enrollment limited to twenty students. May be repeated for credit with consent of instructor. Mr. Baumhoff, Mr. True

196. Archeological Method. (3) II.

Laboratory—6 hours. Prerequisite: course 195 and consent of the instructor. Museum preparation, advanced field investigation, and guidance in preparation of museum material for publication. Enrollment limited to eighteen students. May be repeated for credit with consent of instructor. Mr. Baumhoff

***198. Directed Group Study. (3) I, III.**

Discussion—3 hours. Prerequisite: consent of the instructor. Directed reading and group discussion of selected anthropological problems.

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Olmsted in charge)

Graduate Courses**201. History of Anthropological Theory. (4) I.**

Lecture—2 hours; discussion—1 hour. The historical development of the various fields of anthropology with emphasis upon their interrelationships. Required of all first-year graduate students in anthropology. The Staff

***210. Aspects of Culture Structure. (4) III.**

Seminar—3 hours. Analysis of various phases of culture, such as religion, economics, law, and folklore.

216. Problems in Archaeological Method. (4) II.

Seminar—3 hours. Techniques for analyzing archaeological data; application to various prehistoric cultures. Mr. True

219. Culture and Personality. (4) I.

Seminar—3 hours.

Mr. Cook

***220. Field Course in Linguistics. (4) III.**

Seminar—2 hours; laboratory—2 hours. Prerequisite: courses 110A and 110B. Techniques of eliciting, recording, and analyzing; work with a native speaker. Mr. Olmsted

222. Ethnemics. (4) II.

Seminar—3 hours; Prerequisite: course 120 or consent of instructor. Application of linguistics

* Not to be given, 1968-69.

† Not to be given, fall quarter 1968.

tic, cognitive psychological, and related analytical models to folk taxa. Mr. Cook

225. Kinship and Social Structure. (4) II.

Seminar—3 hours. Componential analysis of kinship systems and discussion of descent group and alliance theories. Mr. Curley

***226. Evolution of Social Organization. (4) II.**

Seminar—3 hours. Diachronic and synchronic analyses of social organization.

239. Problems in African Society and Culture. (4) I.

Seminar—3 hours. Diachronic analyses of traditional institutions in sub-Saharan Africa. Mr. Crowley

***242. Problems in African Prehistory. (4) III.**

Seminar—3 hours. Mr. Baumhoff

***245. Ethnology of Northern and Central Asia. (4) I.**

Seminar—3 hours. 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. Mr. Olmsted

***247. Peoples and Cultures of Oceania. (4) I.**

Seminar—3 hours. Mr. Cook

***250. Theory and Method of Anthropology. (4) I.**

Seminar—3 hours.

253. Concepts and Problems in Physical Anthropology. (4) I.

Seminar—3 hours. Mr. Neville

254. Primate Social Behavior. (4) III.

Seminar—3 hours. Prerequisite: course 154 or equivalent. Analysis of primate social behavior, with particular emphasis on field studies.

Mr. Lindburg

265. Concepts and Problems in Applied Anthropology. (4) I.

Seminar—3 hours. 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. Mr. Chang

292. Seminar in Anthropological Linguistics. (4) II.

Seminar—3 hours. Mr. Olmsted

299. Research. (3-8) I, II, III.

The Staff (Mr. Olmsted in charge)

APPLIED BEHAVIORAL SCIENCES (See also Family and Consumer Sciences)

Orville E. Thompson, Ph.D., *Chairman of the Department*

Department Office, TB-10

Professors:

Frederick L. Griffin, M.S. (*Emeritus*)

Glenn R. Hawkes, Ph.D.

Elwood M. Juergenson, Ph.D. (*also Coordinator of Vocational Teacher Education*)

Sidney S. Sutherland, M.S. (*Emeritus*)

Orville E. Thompson, Ph.D.

Secondary Credentials—Homemaking.—Miss Johnson

Junior College Credentials—Agriculture.—Mr. Juergenson

Bachelor of Science Major Program and Graduate Study. See pages 81 and 133.

Agricultural Education

Lower Division Course

***10. Introduction to Agricultural Education. (3) I.**

Lecture—3 hours. Survey of entire field of education in agriculture. Vocational surveys, occupational analysis. The role and relationship of agriculture in California and the nation to occupational opportunities. Study of professions relating to agriculture. Mr. Thompson

Upper Division Courses

160. Vocational Education. (3) III.

Lecture—3 hours. Philosophy and organization of vocational education, with particular reference to educational principles for agriculture, commerce, home economics, and industry. Mr. Thompson

* Not to be given, 1968-69.

Departmental Major Advisers—See Schedule and Directory Listing.

Credential Counselors: _____.

Secondary Credentials—Agriculture.—Mr. Juergenson

***188. Technical Journalism. (4) I.**

Lecture—4 hours. Style structure, organization, and presentation of technical information. Includes mass communication theory, mass media analysis, and audience analysis.

Miss Regan

198. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Thompson in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Thompson in charge)

Graduate Courses**290. Seminar. (2) I, II, III.**

Discussion—2 hours. Reports and discussions of topics of interest in the fields of agricultural education, home economics education, agricultural extension, and adult education.

Mr. Thompson, Miss Regan

299. Research. (1-6) I, II, III.

Research in agricultural education, home economics education, vocational education, agricultural extension, or adult education.

The Staff (Mr. Thompson in charge)

Supervised Teaching Courses**320A. Introduction to Teaching. (1) I, II, III.**

Lecture—1 hour. Observations and participation in some form of public school work.

Mr. Juergenson

320B. Instructional Materials and Procedures. (3) III.

Lecture—2 hours; laboratory—3 hours. Introduction to the materials and procedures used

in teaching. Use of audio-visual, radio and other teaching aids. Preparation of teaching materials; collecting, organizing, processing, and evaluating community resources.

Mr. Juergenson

320C. Supervised Teaching: Sec. 1, Agriculture. (12) I, II, III.

Field work—student teaching—36 hours. Prerequisite: course 320A; course 320E must be taken concurrently. Directed teaching for candidates for the credential in agriculture

Mr. Juergenson

320C. Supervised Teaching: Sec. 2. Home Economics. (12) I, II, III.

Field work—student teaching—36 hours. Prerequisite: course 320A; course 320E must be taken concurrently. Directed teaching for candidates for the credential in home economics.

Miss Johnson

320E. Curriculum and Instruction Procedures: Sec. 1. Agriculture. (3) I, II, III.

Discussion—3 hours. Prerequisite: all students enrolled in 320E must enroll in 320C concurrently. Planning and organizing an effective curriculum. Selection, organization, evaluation, and use of resource material for teaching.

Mr. Juergenson

320E. Curriculum and Instruction Procedures: Sec. 2. Home Economics. (3) I, II, III.

Discussion—3 hours. Prerequisite: all students enrolled in 320E must enroll in 320C concurrently. Planning and organizing an effective curriculum. Selection, organization, evaluation, and use of resource material for teaching.

Miss Johnson

ART

Richard D. Cramer, M.F.A., Chairman of the Department

Department Office, 101 Art

Professors:

Joseph A. Baird, Jr., Ph.D. (*Director, Laboratory for Research in the Fine Arts and Museology*)

Richard D. Cramer, M.F.A. (*Architecture and Applied Behavioral Sciences*)

Daniel J. Crowley, Ph.D. (*Art and Anthropology*)

Richard L. Nelson, M.A.

Daniel Shapiro

Wayne Thiebaud, M.A.

Ralph M. Johnson, M.A.

Roland C. Petersen, M.A.

Assistant Professors:

Robert C. Arneson, M.F.A.

¹Roy R. DeForest, M.A.

²Susan R. McKillop, Ph.D.

William T. Wiley, M.F.A.

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Assistant Professor:

Joseph A. Arguelles, M.A. (*Acting*)

² Not to be given, 1968-69.

¹ Absent on leave, 1968-69.

² Absent on leave, fall quarter 1968.

³ Absent on leave, winter quarter 1969.

⁴ Absent on leave, spring quarter 1969.

Associate Professors:

^{2, *}Tito L. Giambruni, M.A.

Ruth J. Horsting, M.A.

¹Seymour Howard, Ph.D.

Lecturer:

Charles M. Muskatitch, H.D., F.I.I.C.
(*Curator, Laboratory for Research
in the Fine Arts and Museology*)

Associate:

Jane B. Garritson, M.A.

Departmental Major Advisers.—See the Schedule and Directory.

Preparation for the Major:

Practice of Art: * 3 courses from the following list: Art 2, 3, 4, 12A, 12B, 14A, 14B, 15, 16 (see prerequisites for upper division courses); 8 units chosen from courses 1A, 1B, 1C, 1D. Entering freshmen who have studied art in high school may apply for advance standing by submitting examples of their work for faculty review.

History of Art: Courses 1A, 1B, 1C, 1D; one course in drawing, graphics, or painting; and one course in sculpture or ceramics.

The Major:

Practice of Art: * 18 units of Group A courses under three different artists; course 148 or 149; 8 units from Group C; and 6 units chosen from Group A, B, or C.

History of Art: Two art history courses within each of two periods (e.g., 154A, 154B, and 178B, 178C); courses 180, 189, and 12 units chosen from Group C. Students planning to do advanced work in the History of Art should develop their knowledge of foreign languages (especially German) as early as possible.

Transfer Students.—Before enrolling in Art courses at Davis, ask your faculty adviser to evaluate transfer courses in art.

Graduate Study.—The Department of Art offers a program of study and research leading to the M.A. degree in art practice. Detailed information regarding graduate study may be obtained from the *Announcement of the Graduate Division*.

Teaching Major.—The A.B. degree with a major in the practice of art or in the history of art. Depending on the credential, certain other courses are required. For information see the subject representative.

Teaching Minor.—30 units in Art. These must be selected in consultation with the subject representative.

Subject Representative: Mrs. Garritson.

* Students interested in drawing and painting should take courses 2, 3, and 4; one three dimensional course is recommended: 12A or 14A.

Students interested in sculpture, should take courses 14A, 14B, and 15; courses 2 and 12A are recommended.

Students preparing for graduate work in any of the environmental design professions should take courses 2, 12A or 14A, 16, 121A, 121B, 121C, 121D, 149, 168, 184.

Lower Division Courses**1A. History of Art: Prehistoric through Early Christian. (4) I.**

Lecture—4 hours. Art from 1500 B.C. to 500 A.D.: Lascaux, Jericho, Ur, Thebes, Knossos, Troy, Mycenae, Corinth, Athens, Pergamum, Cerveteri, Rome, and Ravenna; Imhotep, Phidias, Polykleitus, Praxiteles, Scopas, Lysippus, Agesander, and Apollodorus.

1B. History of Art: Byzantine through Renaissance. (4) II.

Lecture—4 hours. European art from the seventh through the sixteenth centuries: Sutton-Hoo, Constantinople, Aachen, Hildesheim, Chartres, Salisbury, Florence, Siena, Rome, Venice; Giotto, the van Eycks, Brunelleschi, Donatello, Piero della Francesca, Botticelli, Leonardo, Michelangelo, Titian, Dürer, and El Greco.

1C. History of Art: Baroque through Modern. (4) III.

Lecture—4 hours. European art after 1600: Caravaggio, Bernini, Rubens, Rembrandt, Velazquez, Vermeer, Wren, Watteau, Mansart, Gainsborough, Reynolds, Canova, Goya, Blake, Constable, Delacroix, Ingres, Manet, Whistler, Richardson, Rodin, Cezanne, Matisse, Picasso, Brancusi, Corbusier, and Klee. Mr. Arguelles

1D. History of Art: Oriental Art. (4) I.

Lecture—4 hours. The art of India, China, and Japan.

2. Elementary Form and Color. (4) I, II, III.

Laboratory—12 hours. Form in composition using black and white media. Introduction to color in composition. The Staff

3. Intermediate Form and Color. (4) I, II, III.

Laboratory—12 hours. Prerequisite: course 2. Color and form in composition. The Staff

4. Introductory Figure Painting. (4) I, II, III.

Laboratory—12 hours. Prerequisite: course 2. Form in composition, with the human figure as subject. The Staff

10. Introduction to Art. (3) I, II, III.

Lecture—3 hours. The understanding and appreciation of painting, sculpture, architecture, and industrial art. Illustrated lectures. Intended for students not specializing in art. Mr. Nelson

12A. Ceramics. (4) I, II, III.

Laboratory—12 hours. Prerequisite: course 2. Beginning ceramics; an introduction to ceramic forms and processes. Mr. Arneson

12B. Ceramics. (4) II, III.

Laboratory—12 hours. Prerequisite: course 12A. Beginning ceramics; introduction to ceramic color and glaze. Mr. Arneson

14A. Elementary Sculpture. (4) I, II, III.

Laboratory—12 hours. Form in space using clay and plaster. Mr. Giambruni, Mrs. Horsting

14B. Intermediate Sculpture. (4) II, III.

Laboratory—12 hours. Prerequisite: course 14A. Form in space using clay and plaster. Mr. Giambruni, Mrs. Horsting

***15. Introductory Figure Sculpture. (4) III.**

Laboratory—12 hours. Prerequisite: course 14A. Form in space with the human figure as subject. Mr. Giambruni, Mrs. Horsting

16. Descriptive Drawing and Rendering. (3) I, II.

Lecture—1 hour; laboratory—6 hours. Methods of objective drawing and of space description; rendering in various media. Mr. Muskavitch

Upper Division Courses**Group A: Practice of Art*****101. Painting: Materials and Carriers. (3) I.**

Laboratory—9 hours. Prerequisite: course 3. Experimentation in media and their supports; fresco, egg tempera, Renaissance oil and mixed techniques, watercolor, gouache, traditional oil lacquers, acrylics. Mr. Petersen

102. Advanced Drawing and Painting. (3) I, II, III.

Laboratory—9 hours. Prerequisite: courses 3, 4. Drawing and painting in various media including oil and polymers. May be repeated for credit. Messrs. Johnson, DeForest, Petersen, Wiley, Shapiro, Thiebaud

104. Advanced Form and Figure Composition.**(3) I, II, III.**

Laboratory—9 hours. Prerequisite: course 4. Problems of light, color, and space that involve the human figure and its environment. May be repeated for credit. Messrs. Johnson, DeForest, Thiebaud, Petersen, Shapiro

***110. Photography. (3) II.**

Laboratory—9 hours. Prerequisite: courses 3 or 128A. Photography as a creative medium using the view camera and the miniature camera. Mr. Petersen

121A. Architectural Design. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: two courses in art practice or design; or consent of instructor. Studio projects in architectural design. Mr. Cramer

121B. Architectural Design. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 121A. Studio projects in architectural design. Mr. Cramer

***121C. Architectural Design. (3) III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: 121B. Studio projects in architectural design. Mr. Cramer

***121D. Architectural Design. (3) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 121C. Studio projects in architectural design. Mr. Cramer

128A. Graphic Arts. (3) I, II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: two courses in art practice. Beginning experimental methods in relief and intaglio printmaking, etching, engraving, aquatint, woodcut, and related media. Mr. Shapiro

128B. Graphic Arts. (3) II, III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 128A. Intermediate experimental methods in relief and intaglio printmaking, etching, engraving, aquatint, woodcut, and related media. Mr. Shapiro

128C. Graphic Arts. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 128B. Advanced experimental methods in relief and intaglio printmaking, etching, engraving, aquatint, woodcut, and related media. Mr. Shapiro

141. Sculpture: Materials and Methods. (3) I.

Laboratory—9 hours. Prerequisite: course 14B. Influences of material and technique on sculptural form; clay, wood, metal, plastics. Mrs. Horsting

***142. Advanced Figure Sculpture. (3) III.**

Laboratory—9 hours. Prerequisite: courses 15, 141. Problems of shape, surface, and space using the human figure as subject. May be repeated for credit. Mr. Giambruni, Mrs. Horsting

***143. Casting Techniques and Theories of Cast Sculpture. (3) II.**

Laboratory—9 hours. Prerequisite: course 14B. Projects in various casting techniques and media with emphasis on bronze and the lost wax process. May be repeated for credit. Mr. Giambruni, Mrs. Horsting

144. Advanced Sculpture. (3) III.

Laboratory—9 hours. Prerequisite: course 141. Problems of form and space in relief and in the round. May be repeated for credit. Mr. Giambruni, Mrs. Horsting

146. Ceramic Sculpture. (3) II, III.

Laboratory—9 hours. Prerequisite: course 12B. Clay as material for sculpture in round and relief. May be repeated for credit. Mr. Arneson

Group B: Theory and Criticism**148. Theory and Criticism: Painting and Sculpture. (4) III.**

Lecture—3 hours. Prerequisite: course 2 or 14A, and one art lecture course. Study of forms and symbols in historic and contemporary masterpieces. Mr. Thiebaud

* Not to be given, 1968-69.

149. Theory and Criticism: Architecture. (4) II.

Lecture—3 hours. Prerequisite: course 2 or 14A; one art lecture course, or consent of instructor. Aesthetic theories of design styles, historic and contemporary. Mr. Cramer

Group C: History of Art**150. The Arts of Africa, Oceania, and Prehistoric Europe. (4) I.**

Lecture—3 hours. The traditional arts of Africa and Oceania and of the prehistoric and folk populations of Europe and Asia in their cultural contexts. Mr. Crowley

151. The Arts of the Indians of the Americas. (4) II.

Lecture—3 hours. Arts of the extinct societies of Mexico, Peru, and related regions, and contemporary Indian arts and crafts. Mr. Crowley

154A. Greek Art: The Helladic through Archaic Periods. (4) I.

Lecture—3 hours. The art of Classical Greece to the Persian invasions. The Geometric, Orientalizing, and Archaic styles: the Doric temple, black- and red-figure vase painting, the *Kore* and *Kouros*. Corinth, Selinus, Paestum, Polymedes, Kleitias, Erekias, Epictetus, Euthymides, Kritios, and Kalamis.

154B. Greek Art: The Gold and Silver Ages. (4) II.

Lecture—3 hours. Greek art from the time of Pericles to that of Alexander: Olympia, the Athenian Acropolis, Bassae, Epidaurus, Halicarnassus; Myron, Phidias, Polykleitos, the Achilles Painter, Praxiteles, and Scopas.

154C. Greek Art: The Hellenistic Age. (4) III.

Lecture—3 hours. Art in the Greek world from 322 B.C. until the time of Imperial Rome: Pergamum, Alexandria, Priene, and Delos; Lysippus, Polyeuctus, Boethus, Agesander, Philoxenus, and Nikeratus.

155. Roman Art. (4) III.

Lecture—3 hours. The art of Republican and Imperial Rome, its buildings, portraiture, historic reliefs, and murals: Pompeii, Nîmes, Praeneste, Ostia, Baalbeck, Palmyra, Petra, Spoleto, Trier; Forum Romanum, Ara Pacis, Pont du Gard, Colosseum, Pantheon, Baths of Caracalla, and the Arch of Constantine.

***160. History of Minor Art. (4) I.**

Lecture—3 hours. Great periods, masters, and masterworks of minor art, such as Tutankhamen's throne, harp of Ur, Tanagra figurines, Portland vase, Bayeux tapestry, Suger's chalice, Majolica; Pisanello, Cellini, Chippendale, Adam,

Wedgewood, Morris, Tiffany, Eames, and others.

***162. History of Graphic Art. (4) III.**

Lecture—3 hours. Printmaking from the Renaissance to modern times; such printmakers as the Master of the Nuremberg Chronicle, Durer, Van Dyck, Rembrandt, Goya, Daumier, Whistler, Picasso, and Hayter.

***168. The History of Urban Form. (4) II.**

Lecture—3 hours. An historical investigation of the evolution of great cities; physical forms of town planning in the past as a guide to modern urban developments. Consideration of Rome, Constantinople, Venice, Paris, London, and New York. The relation of European and American planning concepts. Field trips. Mr. Baird

176A. Art of the Middle Ages: Early Christian to Romanesque. (4) I.

Lecture—3 hours. The art of Christian Europe from the founding of Constantinople to the tenth century; the early Christian, Byzantine, Carolingian, and Ottonian periods; the Basilica of St. Peter's, St. Mark's in Venice, Hagia Sophia, St. Gall, Sutton-Hoo, and the Lindisfarne Gospels.

176B. Art of the Middle Ages: Romanesque through Gothic. (4) II.

Lecture—3 hours. The arts in Christian Europe from the eleventh to the fifteenth centuries: St. Sernin, Gislebertus, Poitiers, Caen, St. Ambrose, St. Denis, Chartres, Rheims, Salisbury, Cologne, Santa Croce, Strasbourg, Naumburg, Claus Sluter, and Villard de Honnecourt.

177A. Northern Renaissance Art. (4) II.

Lecture—3 hours. Art of the Lowlands in the fifteenth and sixteenth centuries. The van Eycks, Master of Flemalle, Roger van der Weyden, Bouts, Geertgen, Bosch, and Bruegel.

177B. Northern Renaissance Art. (4) III.

Lecture—3 hours. Art between the Rhine and the Danube in the fifteenth and sixteenth centuries: Multscher, Riemenschneider, Witz, Schongauer, Durer, Grunwald, Cranach, Alt-dorfer, and Holbein.

***178A. Italian Renaissance Art. (4) I.**

Lecture—3 hours. Art of the Trecento: Nicola and Giovanni Pisano, Cimabue, Giotto, Duccio, the Lorenzetti, Simone Martini. Emphasis on Assisi, Florence, and Siena.

178B. Italian Renaissance Art. (4) II.

Lecture—3 hours. Art of the fifteenth century: Ghiberti, Brunelleschi, Masaccio, Donatello.

^a Not to be given, 1968-69.

tello, Fra Angelico, Piero della Francesca, Botticelli, Mantegna, and the Bellini. Emphasis on Florence, Northern Italy, and Venice.

178C. Italian Renaissance Art. (4) III.

Lecture—3 hours. Art of the sixteenth century: Leonardo, Michelangelo, Raphael, Bramante, Giorgione, Titian, Correggio, Pontormo, and Tintoretto. Emphasis on Rome, Florence, and Venice.

179A. Baroque Art. (4) II.

Lecture—3 hours. Architecture, sculpture, and art of the garden, from formative stages of the Baroque in the sixteenth century to creation of the Rococo. Emphasis on western Europe; prototypes and developments. Bernini, Mansart, and other major artistic personalities.

Mr. Baird

179B. Baroque Art. (4) III.

Lecture—3 hours. Painting from 1590 to 1720. Such Italian, Spanish, Flemish, French, and English masters as Caravaggio, Velasquez, Rubens, Van Dyck, Claude, and Poussin will receive particular attention. Some attention to painting and drawing for the theater and other spectacles.

Mr. Arguelles

180. Readings in Art Historical Methods. (4) III.

Lecture—3 hours. Works by major art chroniclers, historians, and theorists of the historic and recent past: Plutarch, Pliny, Lucian, Suger, Alberti, Vasari, Bellori, Winckelmann, Ruskin, Wölfflin, Berenson, Riegel, and Panofsky.

Mr. Baird

183A. Modern Painting: Neo-Classicism to Realism. (4) I.

Lecture—3 hours. European painting from the French Revolution through mid-nineteenth-century academicism. Goya, David, Ingres, Gericault, Delacroix, Daumier, Corot, Millet, Rousseau, Courbet, early Manet, Reynolds, Blake, Lawrence, Constable, Turner, Overbeck, Feuerbach.

Mr. Arguelles

183B. Modern Painting: Impressionism through Early Expressionism. (4) II.

Lecture—3 hours. European painting from 1865 to 1910: later Manet, Degas, Monet, Renoir, Cezanne, Seurat, Van Gogh, Lautrec, Gauguin, Bernard, Vuillard, Bonnard, Redon, Moreau, Matisse, Derain, Rouault, Rossetti, Sickert, Munch, Corinth, Kokoschka, Kirchner, Nolde, Soutine, and Modigliani.

Mr. Arguelles

183C. Modern Painting: Cubism to the Present. (4) III.

Lecture—3 hours. International painting styles from 1910 to the present: Picasso, Braque, Boccioni, Severini, Delaunay, Leger, Malevitch, Mondrian, Kandinsky, Klee, Beckmann, Grosz, Duchamp, Chirico, Chagall, Sch-

witters, Ernst, Arp, Miro, Masson, Gorky, de Kooning, Johns, Orozco, Bacon, Sutherland, Burri, Soulages, Appel, and Dubuffet.

Mr. Arguelles

184. Architecture in the Twentieth Century. (4) III.

Lecture—3 hours. The forms and substYLES of modern architecture, with emphasis on the development of organicism in the works of Frank Lloyd Wright and of the international style in the work of Le Corbusier and Mies Van Der Rohe.

Mr. Cramer

188A. The Art of Latin America. (4) I.

Lecture—3 hours. Emphasis on architecture, sculpture, and paintings of Mexico from colonial times to the present; the American Southwest, colonial art in Peru, and eighteenth century to modern architecture in Brazil. European backgrounds and creative originality in the New World.

Mr. Baird

*188B. The Art of the United States. (4) II.

Lecture—3 hours. A survey of three centuries of American building arts, with emphasis on colonial, Georgian, nineteenth and twentieth century architecture. Particular attention to California (especially northern California). Field trips.

Mr. Baird

*188C. The Art of the United States. (4) III.

Lecture—3 hours. Emphasis on painting and sculpture. The great eras from colonial to contemporary; notable masters and schools. Special attention to pictorial art since 1850; some attention to the leading figures in California of the later nineteenth and early twentieth centuries. Field trips.

Mr. Baird

189. Museum Methods and Connoisseurship. (4) III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: basic art history courses; or consent of instructor. The history of collecting; problems of media and connoisseurship, especially in painting, drawing, and graphic arts. Study of iconography, techniques of preservation and restoration, museum registration and storage. Preparation of an exhibition at Davis, with printed catalogue. Field trips.

Mr. Baird, Mr. Muskavitch

Special Study Courses

198. Directed Group Study. (1-5) I, II, III. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses

201. Drawing and Painting in Selected Media. (4) I, II, III.

Lecture—3 hours. Original work produced for class discussion and criticism. May be repeated for credit.

The Staff

* Not to be given, 1968-69.

***202. Sculpture in Selected Media. (4) I, II, III.**

Lecture—3 hours. Original work produced for class discussion and criticism. May be repeated for credit.

The Staff

290. Seminar. (4) I, II, III.

Seminar—3 hours. Original works produced for group discussion and criticism; associated topics of a contemporary and historical nature. May be repeated for credit.

The Staff

299. Individual Study. (1-6) I, II, III.

The Staff

Professional Course**300. Practice and Principles of Art Education. (3) II.**

Lecture—2 hours; laboratory—4 hours. Prerequisite: senior or graduate standing; or consent of instructor. Art education and practice of techniques used in elementary and secondary schools.

Mrs. Garriton

ASTRONOMY—See Physics**ATMOSPHERIC SCIENCE—See Resource Sciences****AVIAN MEDICINE—See Epidemiology and Preventive Medicine****BACTERIOLOGY**

Allen G. Marr, Ph.D., *Chairman of the Department*

Department Office, 156 Hutchison Hall

Professors:

Robert E. Hungate, Ph.D.

John L. Ingraham, Ph.D.

Allen G. Marr, Ph.D.

Herman J. Phaff, Ph.D. (*Bacteriology and Food Science and Technology*)

^{2,3}Mortimer P. Starr, Ph.D.

Associate Professor:

Donald M. Reynolds, Ph.D.

Assistant Professors:

Clifton E. Dowell, Ph.D.

Donald P. Kessler, Ph.D.

◇ ◇ ->

Associate Professor:

Martin W. Miller, Ph.D. (*Food Science and Technology*)

Assistant Professor:

Norma J. Lang, Ph.D. (*Botany*)

Major Advisers.—Mr. Hungate, Mr. Reynolds, Mr. Kessler.

The Major Program. The undergraduate major programs are designed to provide a proper balance of studies in the biology of bacteria and other microorganisms together with appropriate courses in mathematics and physical science. The Bachelor of Science program offers greater emphasis in mathematics and physical science. Both the Bachelor of Arts program and the Bachelor of Science program are suitable for students who plan to do graduate work in a biological science or who wish a professional career in bacteriology.

Either major is appropriate for students con-

templating a career in Medical Technology. Such students are advised to take Veterinary Microbiology 127 and 128 and a year laboratory course in physics in addition to the courses required for a major in bacteriology.

Bachelor of Arts Major Program

Lower Division Courses.—Bacteriology 2; Biology 1; Botany 2, or Zoology 2; Chemistry 1A-1B-1C, 8A-8B; Mathematics 16A-16B and either 13, 16C, or 36A-36B; Physics 2A-2B-2C.

Upper Division Courses.—Bacteriology 110, 130 or 131, 140; Biochemistry and Biophysics 101A-101B-101L; Chemistry 5; Genetics 100A-100B; and one course from the following group: Bacteriology 150; Botany 118, 119A-119B; Zoology 110; and two additional units in bacteriology which may include Veterinary Microbiology 127.

Bachelor of Science Major Program

Lower Division Courses.—Bacteriology 2; Biology 1; Chemistry 1A-1B-1C, 5; Mathematics 21A-21B-21C, 13; Physics 4A-4B-4C-4D. Recommended: elementary courses in French or German.

Upper Division Courses.—Bacteriology 110, 130 or 131, 140, 160 or 170; Biochemistry and Biophysics 101A-101B-101L; Chemistry 110A-110B-110C, 112A-112D-112E; Genetics 100A-100B; and one course from the following group: Bacteriology 150; Botany 118, 119A-119B; Zoology 110.

Minor in bacteriology: 20 units of courses in bacteriology.

Honors and Honors Program (see page 113).

* Not to be given, 1968-69.

² Absent on leave, fall quarter 1968.

³ Absent on leave, winter quarter 1969.

Graduate Study (see page 133).—The Graduate Group in Microbiology offers programs of study and research leading to the M.A. and Ph.D. degrees in general microbiology, including bacteriology. The offerings of the Department of Bacteriology are augmented by courses and faculty of the Departments of Biochemistry and Biophysics, Botany, Food Science and Technology, Viticulture and Enology, and the Schools of Veterinary Medicine and of Medicine. For detailed information regarding graduate study in microbiology, address the Graduate Adviser in Microbiology, Department of Bacteriology.

Teaching Major.—Requirements for the principal teaching major are the same as those for the departmental major.

Teaching Minor.—30 units selected from the B.A. or B.S. Bacteriology major programs, as approved by the Department Subject Representative.

Subject Representative: Mr. Reynolds

Lower Division Course

2. Introduction to Microbiology. (5) I, II, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biology 1; Chemistry 1A. A general introduction to the biology of bacteria and of other microorganisms. **The Staff**

Upper Division Courses

110. Structure and Function of Bacteria. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 2. Analysis of the structure and ultrastructure of bacteria in relationship to physiological function; osmotic behavior of bacterial cells. **Mr. Marr**

130. Bacterial Physiology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2; Biochemistry 101B; Mathematics 16A. Growth of bacteria; biochemical and genetic regulation of metabolism; effects of the physical and chemical environment. **Mr. Ingraham**

131. Bacterial Metabolism. (3) I.

Lecture—3 hours. Prerequisite: course 2; Biochemistry 101A. Anaerobic and aerobic metabolism of organic and inorganic foods by bacteria, including pathways of synthesis. **Mr. Hungate**

132. Bacterial Metabolism Laboratory. (2) I.

Laboratory—6 hours. Prerequisite: course 2; Biochemistry 101B. Quantitative experiments in microbial metabolism, using selected methods of microchemical analysis, manometry liquid and gas phase chromatography, spectrophotometry, and isotopic tracers. **Mr. Hungate**

140. Bacterial Diversity and Ecology. (5) III.

Lecture—2 hours; laboratory—9 hours. Prerequisite: course 2; Chemistry 8B. Principles of

bacterial diversity and bacterial ecology. Survey of the major systematic groups of bacteria, with intensive study of selected microorganisms and habitats. **Mr. Starr**

150. Protistology. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 2 and Botany 2; or Zoology 2. A survey of algae, protozoa and yeast, including selected physiological topics.

Mr. Phaff, Mr. Hungate, Miss Lang

160. Bacterial Viruses. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 130; Biochemistry 101B. Structure of viruses; physiology and biochemistry of viral infections; genetics of viruses; lysogeny. **Mr. Dowell**

170. Bacterial Genetics. (4) II.

Lecture—4 hours. Prerequisite: course 2; Genetics 100B; Biochemistry 101B. Mutation and genetic recombination in bacteria and bacteriophages. Mechanisms of replication, recombination, and gene expression. **Mr. Kessler**

171. Bacterial Genetics Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 170 (may be taken concurrently). Selection of mutants and analysis of genetic recombination in bacteria and bacteriophages. **Mr. Kessler**

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. **The Staff**

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

Prerequisite: consent of instructor. **The Staff**

Graduate Courses

230. Bacterial Physiology. (4) III.

Lecture—4 hours. Prerequisite: course 130; Biochemistry 101B; course 170 recommended. Economics of bacterial growth; biochemical and genetic regulation of metabolism. **Mr. Ingraham, Mr. Marr**

***240. Bacterial Taxonomy. (2) III.**

Lecture—2 hours. Prerequisite: course 140. Principles and procedures of bacterial taxonomy. Offered in even-numbered years. **Mr. Starr**

250. Yeasts and Related Organisms. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: a general course in microbiology, botany, biochemistry, and consent of instructor. Recommended: a course in cryptogamic botany. Morphology, development, classification, and distribution of yeasts; relation to other fungi; growth requirements; physiological activities. **Mr. Phaff, Mr. Miller**

* Not to be given, 1968-69.

291. Seminar in General Microbiology. (1) I, II, III.

Seminar—1 hour. A review and discussion of the current literature and developments in the field of Microbiology with presentations by individual students.

The Staff

292. Seminar in Bacterial Physiology. (1) I, II, III.

Seminar—1 hour. A review and discussion of the current literature and developments in bacterial physiology with presentations by individual students.

Mr. Marr, Mr. Ingraham

293. Seminar in Bacterial Genetics. (1) I, II, III.

Seminar—1 hour. A review and discussion of the current literature and developments in bacterial genetics with presentations by individual students.

Mr. Kessler

BIOCHEMISTRY—See Also Animal Science

BIOCHEMISTRY AND BIOPHYSICS

_____, Chairman of the Department

Department Office, 554 Hutchison Hall

Professors:

Eric E. Conn, Ph.D.

Lloyd L. Ingraham, Ph.D.

*Paul K. Stumpf, Ph.D.

Associate Professors:

Sterling Chaykin, Ph.D.

Richard S. Criddle, Ph.D.

Roy H. Doi, Ph.D.

Jack Preiss, Ph.D.

Assistant Professors:

George E. Bruening, Ph.D.

Jerry L. Hedrick, Ph.D.

Irwin H. Segel, Ph.D.

◇ ◇ ◇

Professors:

Robert E. Feeney, Ph.D. (*Food Science and Technology*)

Associate Professors:

Tsune Kosuge, Ph.D. (*Plant Pathology*)

Mendel Mazelis, Ph.D. (*Food Science and Technology*)

Lecturers:

Ray C. Huffaker, Ph.D. (*Agronomy*)

Francis E. Rudert, M.S.

Departmental Major Advisers.—See Schedule and Directory listing.

Bachelor of Science Major Program and Graduate Study. See pages 81 and 133.

The department offers an undergraduate

¹ Absent on leave, 1968-69.

294. Seminar in Bacterial Virology. (1) I, II, III.

Seminar—1 hour. Prerequisite: consent of instructor. An examination of current topics in the structure, replication, and genetics of bacterial viruses.

Mr. Dowell

295. Seminar in Microbial Ecology. (1) I, II, III.

Seminar—1 hour. Prerequisite: consent of instructor. A review and discussion of the current literature in the ecology of protists and bacteria with presentations by individual students.

Mr. Hungate

298. Group Study. (1-5) I-II-III.

Prerequisite: consent of instructor. The Staff

299. Research. (1-12) I, II, III.

The Staff

major in Biochemistry. For graduate study the Department of Biochemistry and Biophysics cooperates with the Group in Comparative Biochemistry for work leading to the M.S. and Ph.D. degrees in comparative biochemistry. The department cooperates with the Group in Biophysics for work leading to the Ph.D. degree in biophysics.

Upper Division Courses

101A. General Biochemistry. (3) I, II.

Lecture—3 hours. Prerequisite: Chemistry 8B or 112B. Recommended: introductory course in bacteriology, botany, or zoology. Introduction to the chemistry and metabolism of biologically important compounds; dynamic aspects of biochemistry with examples from animals, plants, and microorganisms.

Mr. Conn, Mr. Segel

101B. General Biochemistry. (3) II, III.

Lecture—3 hours. Prerequisite: course 101A. A continuation of 101A.

Mr. Conn, Mr. Segel

101L. General Biochemistry Laboratory. (5) I, III.

Lecture—2 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 require limited experience in the use of biochemical techniques as laboratory tools.

Mr. Bruening, Mr. Doi, Mr. Preiss

108. Biochemical Control Mechanisms. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101B. The mechanisms by which metabolism is regulated in living cells. The role of variations

in the intracellular levels of intermediates, activators, and inhibitors; enzyme induction and repression; and multiple forms of enzymes.

Mr. Doi, Mr. Segel

122. Plant Biochemistry. (3) II.

Lecture—3 hours. Prerequisite: Biochemistry 101B. The chemistry of important plant constituents and processes such as photosynthesis and respiration; carbohydrate, fat, and nitrogen metabolism.

Mr. Conn

190. Proseminar in Biochemistry. (1) II.

Seminar—1 hour. Prerequisite: consent of instructor. Discussion of the historical developments of modern biochemistry.

The Staff (Mr. Segel in charge)

194H. Special Study for Honors Students. (1-5)

I, II, III.

Seminar—1-5 hours. Prerequisite: open only to majors of senior standing on honors list. Independent study of selected topics under the direction of a member of the staff. Completion will involve the writing of a senior thesis.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Seminar—1-5 hours. Prerequisite: consent of instructor. The Staff (Mr. Segel in charge)

Graduate Courses

201A-201B-201C. Advanced General Biochemistry.

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 101B or consent of instructor; Chemistry 109B or 110C, 112C. Physical and chemical properties of amino acids, proteins, lipids, carbohydrates and nucleic acids; methods of isolating proteins; enzymes, including kinetics, cofactors, and type reactions; and the study of organized cell structures. The Staff (Mr. Chaykin in charge)

202A-202B. Advanced Biochemistry Laboratory.

(6-6) II-III.

Lecture—1 hour; laboratory—15 hours. Prerequisite: course 201A; Chemistry 5. Laboratory methods and procedures used in biochemical research. Critical evaluation of experimental design and data is stressed.

The Staff (Mr. Chaykin in charge)

203. Carbohydrates. (3) I.

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. The chemistry, metabolism, and biological functions of the various classes of carbohydrates and their polymers. Biosynthesis of simple and complex sugars and polysaccharides.

Mr. Preiss

204. Nucleic Acids. (3) III.

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. The physical and biological properties of nucleic acids; biosynthetic pathways; metabolism and structure of bases,

nucleotides and their occurrence and distribution. The relation of structure and function of RNA and DNA to heredity, coding, and protein synthesis.

Mr. Bruening, Mr. Doi

205. Biochemical Mechanisms. (3) II.

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.

Mr. Ingraham

206. Physical Biochemistry of Macromolecules.

(3) I.

Lecture—3 hours. Prerequisite: course 201C or consent of instructor; Chemistry 110C. Application of modern physical concepts and experimental methods to the problems of large molecules of biological interest.

Mr. Criddle

*207. Lipids. (3) I.

Lecture—3 hours. Prerequisite: course 201C or consent of instructor. A discussion of the chemistry, metabolism and experimental methodology unique to fatty acids, triglycerides, phospholipids, plasmalogens, sphingolipids.

Mr. Stumpf

*220. Principles of Comparative Biochemistry. (3) I.

Lecture—3 hours. Prerequisite: Biochemistry 201C or consent of instructor. An advanced treatment of comparative biochemistry. Comparisons of living systems, their structures and functions on a molecular basis, biochemical unity and diversity; protein structures and organized enzyme systems. Comparison of biochemical processes related to photobiology, metabolism and excretion. Mr. Feeney, Mr. Hedrick

*240. Selected Topics in Biochemistry. (2) I.

Lecture—2 hours. Prerequisite: course 201C or consent of instructor.

The Staff

250. Biochemical Literature. (1) I, II, III.

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Critical reading and evaluation of the current biochemical literature. Selected papers will be presented and discussed in detail.

Mr. Ingraham

270. Advanced Research Conference. (1) I, II, III.

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Presentation and critical discussions of the research activities of various members of the local biochemical community; primarily designed for graduate students.

Mr. Ingraham

291. Current Progress in Biochemistry. (1) I, II, III.

Seminar—1 hour. Prerequisite: course 201C or consent of instructor. Seminars presented by guest lecturers on the subject of their own research activities.

Mr. Conn

299. Research. (1-9) I, II, III.

The Staff

* Not to be given, 1968-69.

BIOLOGICAL SCIENCES

_____, Chairman of the Committee
Committee Office, _____

Major Advisers.—See *Schedule and Directory*.

The Major Program. The major programs in biological sciences provide the opportunity to study a broader area of biology than is possible with most departmental programs. The programs prepare for a career in professions such as teacher, laboratory technician, medical technologist, etc. Both Plan I and Plan II serve as a basis for training in professional schools (Medicine, Dentistry, Pharmacy, etc.) and for graduate study leading to advanced degrees and careers in research. Plan II should be selected by those interested in the study of the chemical and molecular aspects of life. Students who follow Plan I and are interested in a career as laboratory technician, admission to professional schools or graduate work in physiology or chemical biology should consider taking Chemistry 5 and a year laboratory course in physics. For those contemplating medical technology, veterinary microbiology 127 and courses such as medical microbiology and parasitology are recommended in addition to the above.

The Committee in Charge has issued a list of upper division courses acceptable in the major and a list of courses which can be used to satisfy the specific upper division area requirements for Plan I. Copies can be obtained from advisers and from the committee office.

Plan I

Bachelor of Arts Major Program

Lower Division Courses.—Required: Biology 1; Botany 2; Zoology 2; Bacteriology 2; Chemistry 1A-1B, 8A-8B. Recommended: other introductory courses in natural sciences.

Upper Division Courses.—A total of 36 units in biological sciences, including at least one course in each of the following six categories: invertebrate zoology, vertebrate zoology, plant taxonomy, plant morphology, genetics and evolution, and physiology.

Bachelor of Science Major Program

Lower Division Courses.—Required: Biology 1; Botany 2; Zoology 2; Bacteriology 2; Chemistry 1A-1B, 8A-8B; Physics 2A-2B-2C; Mathematics 13. Recommended: Chemistry 1C; Mathematics 16A, 16B, 16C; other introductory courses in natural sciences.

Upper Division Courses.—A total of 45 units in biological sciences, including at least one course in each of the following four categories: animal morphology and taxonomy, plant morphology and taxonomy, genetics and evolution, and physiology.

Not fewer than two courses in botany and two in zoology are required. To complete the

45-unit requirement, students may elect additional upper division courses in the above-mentioned groups or in other fields of biology.

Plan II

Bachelor of Arts Major Program

Lower Division Courses.—Required: Biology 1; Botany 2; Zoology 2; Bacteriology 2; Chemistry 1A-1B-1C, 5 or 1A-7A-7B; Physics 2A-2B-2C or 4A-4B-4C; Mathematics 13; 16A-16B-16C or 21A-21B-21C.

Upper Division Courses.—Required: Chemistry 112A-112B-112C or 112A-112D-112E; Biochemistry 101A-101B; Genetics 100A-100B; 15 units in biological sciences.

Bachelor of Science Major Program

Lower Division Courses.—Required: same as for Bachelor of Arts under Plan II.

Upper Division Courses.—Required: A total of 45 units. Required and elective courses same as for Bachelor of Arts under Plan II and, in addition, Chemistry 110A-110B-110C; Biochemistry 101L. Recommended: an upper division course in physics.

Minor in Biological Sciences

A minimum of 30 units of biology, including the undergraduate core: Biology 1, Botany 2, Zoology 2 and Bacteriology 2.

The Honors Program.—Students on the honor list may enroll in an Honors Program of courses leading to honors with the bachelor's degree (see page 113).

A special study course (194H) involving either independent research or reading on an appropriate topic, followed by preparation of an honors thesis (course 195H) based primarily on the work done in the prerequisite course, must be completed.

Teaching Major.—A degree in Biological Sciences satisfies the requirement for a teaching major in the life sciences for both elementary and secondary teaching credentials, except that for the elementary credential Entomology 1 or 10 must be included.

Teaching Minor.—A minimum of 30 units of biology, including the undergraduate core: Biology 1, Botany 2, Zoology 2, and Bacteriology 2.

Subject Representative: _____

Upper Division Courses

189. Integration of Biological Concepts. (3) III.

Lecture—2 hours; discussion—1 hour. Prerequisite: twenty upper division units in biology. A detailed examination in depth of the coherence of biology through a study of several unifying themes, for example, evolution. Mr. Stebbins

194H. Special Study for Honors Students. (3-6)**I, II, III.**

Prerequisite: enrollment limited to honors students. Independent research and/or reading on selected topics.

The Staff (Committee Chairman in charge)

BIOLOGY (Interdepartmental Courses)

Biology courses offered jointly by two or more departments or groups are listed below. Information concerning instructors is given under the individual departments.

Lower Division Courses**1. Principles of Biology. (6) I, II, III.**

Lecture—4 hours; laboratory—6 hours. Prerequisite: Chemistry 1B. An interdisciplinary course designed for majors in the biological sciences. Emphasis on the unity of basic biological principles as related to cell structure and function, reproduction, genetics, growth and differentiation, evolution, ecology, and taxonomy.

- I. Mr. Ketellapper (Botany),
- II. Mr. Wolfe (Zoology),
- III. Mr. Marr (Bacteriology)

(Offered by Bacteriology, Botany, and Zoology)

10. General Biology. (4) I, III.

Lecture—3 hours; discussion—1 hour. Not open for credit to those who have had course 1. 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.

I. Mr. Spieth (Zoology),

III. Mr. Ketellapper (Botany)

(Offered by Botany and Zoology)

BOTANYErnest M. Gifford, Jr., Ph.D., *Chairman of the Department*

Department Office, 143 Robbins Hall

Professors:

- Daniel I. Axelrod, Ph.D.
- Alden S. Crafts, Ph.D. (*Emeritus*)
- Herbert B. Currier, Ph.D.
- Ernest M. Gifford, Jr., Ph.D.
- C. Ralph Stocking, Ph.D.
- John M. Tucker, Ph.D.
- Grady L. Webster, Ph.D.
- T. Elliot Weier, Ph.D. (*Emeritus*)

Associate Professors:

- Floyd M. Ashton, Ph.D.
- Paul A. Castelfranco, Ph.D.
- Elizabeth G. Cutter, Ph.D., D.Sc.
- Hendrik J. Ketellapper, Ph.D.
- Jack Major, Ph.D.
- Kenneth Wells, Ph.D.

Assistant Professors:

- Michael G. Barbour, Ph.D.
- Bruce A. Bonner, Ph.D.
- Donald W. Kyhos, Ph.D.
- Norma J. Lang, Ph.D.
- Robert F. Norris, Ph.D.
- Thomas E. Ragland, Ph.D.

**Lecturers:**

- David E. Bayer, Ph.D.
- Oliver A. Leonard, Ph.D.

Departmental Major Adviser.—Mr. Wells**The Major Programs**

The Bachelor of Science major program should be elected by those students who plan advanced study in botany, who wish to obtain general secondary teaching credentials, or who wish training for a position requiring a detailed knowledge of plants. Students who wish a less intensive program in botany, but one that acquaints the students with plant life and its importance, should elect the Bachelor of Arts major program.

Bachelor of Science Major Program

Lower Division Courses.—Required: Biology 1; Botany 2; Zoology 2; Chemistry 1A, 1B, 8B; Physics 2A, 2B, 2C; plus 8 additional units in related natural science subjects. German or French is the required language. Recommended: Bacteriology 2; Chemistry 1C; and Mathematics 13, 16A, 16B, 16C.

Upper Division Courses.—Required: Botany 105, 108, 111, 116, 118 or 119A and 119B; Genetics 100B; 6 (3 if Botany 119A and 119B are selected) additional units in botany; plus 8 units in related natural science courses. Recommended: Biochemistry 101A and 101B.

Bachelor of Arts Major Program

Lower Division Courses.—Required: Biology 1; Botany 2; Zoology 2; Chemistry 1A, 1B. Recommended: Chemistry 8B.

Upper Division Courses.—Required: 36 units in botany and allied areas; 12 upper division units from the humanities or the social sciences, in addition to the college breadth requirements.

Honors and Honors Program (see page 113).—Students on the honors list may elect to substitute a maximum 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.

Teaching Major.—The requirements for the teaching major are the same as for the departmental major for degree (A.B. or B.S.).

Teaching Minor.—Botany 2; and a minimum of 23 units in botany or closely related subjects. Students must consult with subject representative.

Subject Representative: Mr. Wells

Graduate Study.—Graduate programs leading to M.A., M.S., and Ph.D. degrees are offered in cytology, plant physiology, anatomy, morphology, taxonomy, ecology, mycology, phycology, and allied areas. The resources of the department are augmented by appropriate courses in related departments.

Lower Division Course**2. General Botany. (5) I, II, III.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biology 1. Structure, physiology, and taxonomy of plants, with special emphasis on seed plants.

The Staff

Upper Division Courses**105. Plant Anatomy. (5) II.**

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Structure and growth of meristems; development and structure of cells, tissues, and tissue systems; comparative anatomy of stem, root, and leaf.

Miss Cutter

107. Weed Control. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2; Chemistry 8B. Introduction to the physiological and chemical principles underlying control of weeds; principles of preventive, cultural, and biological weed control; identification of common weeds.

Mr. Norris

108. Systematic Botany of Flowering Plants. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. 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.

Mr. Tucker

111. Introduction to Plant Physiology. (5) I.

Lecture—5 hours. Prerequisite: course 2; Chemistry 8B (may be taken concurrently). The fundamental activities of plants such as absorption, transpiration, synthesis of foods, respiration, growth, and reproduction.

Mr. Stocking

114. Biology of Fungi and Algae. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Not open for credit to students having received credit for courses 118, 119A, or 119B. An introduction to the morphology, taxonomy, evolution, and physiology of the fungi and the algae.

Miss Lang, Mr. Wells

***115. Mosses and Liverworts. (3) II.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 2. Morphology, taxonomy, and ecology of mosses and liverworts. Field trips.

116. Organization and Phylogeny of Vascular Plants. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Structure, reproduction, and phylogeny of the major groups of living and extinct vascular plants; special emphasis given to seed plants.

Mr. Gifford

117. Plant Ecology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 111. Study of individual plants, species, and vegetation in relation to environment and of modification of the environment by vegetation.

Mr. Barbour, Mr. Major

118. Phycology. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Morphology, physiology, genetics, evolution, distribution, cultivation, and economic importance of algae; field trip.

Miss Lang

119A. Mycology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2. Introduction to structure, relationships, ontogeny, and genetics of selected species of Ascomycetes, Basidiomycetes, Zygomycetes, Chytridiomycetes, Phycomycetes, and Ascomycetes.

Mr. Wells

119B. Mycology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 119A. Introduction to structure, relationships, ontogeny, and genetics of selected species of Basidiomycetes and Fungi Imperfecti, ultrastructure of fungi; genetics of mating systems; mycorrhizae.

Mr. Wells

120A. Plant Physiology. (3) I.

Lecture—3 hours. Prerequisite: course 111; Biochemistry 101A (may be taken concurrently). Cellular physiology, plant water relations, and translocation.

Mr. Currier

* Not to be given, 1968-69.

120B. Plant Physiology. (3) II.

Lecture—3 hours. Prerequisite: course 111; Biochemistry 101A, 101B (may be taken concurrently). Mineral nutrition, photosynthesis, respiration, and general plant metabolism.

Mr. Ragland

120C. Plant Physiology. (3) III.

Lecture—3 hours. Prerequisite: course 111; Biochemistry 101A. Recommended: courses 120A and 120B; Biochemistry 101B. Internal and environmental regulation of plant growth and development.

Mr. Bonner

121A. Plant Physiology Laboratory. (2) I.

Laboratory—6 hours. Prerequisite: course 120A (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 120A.

Mr. Currier

121B. Plant Physiology Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 120B (may be taken concurrently); Chemistry 5. Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 120B.

Mr. Ragland

121C. Plant Physiology Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 120C (may be taken concurrently). Laboratory procedures in plant physiology. Experiments selected to follow subject-matter sequence of course 120C.

Mr. Bonner

130A. General Cytology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 2 or Zoology 2; Genetics 100B or Biochemistry 101A. An analysis of the structure and ultrastructure of cells; the relationship between structure and function at cellular and subcellular levels. Consideration of cell particulates, membranes, endoplasmic reticulum, mitochondria, plastids, the golgi zone and their relationship to the metabolic nucleus.

130B. General Cytology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 130A. An analysis of the structure and function of cells during mitosis, meiosis, gametogenesis and fertilization at cellular and subcellular levels.

140. Paleobotany. (4) III.

Lecture—2 hours; laboratory—3 hours. Analysis of the origins and migrational history of modern vegetation; floristic evolution and paleoclimate; paleoecologic analysis of Cenozoic floras.

Mr. Axelrod

141. Plant Geography. (3) II.

Lecture—3 hours. Prerequisite: course 108 or 116, course 117 recommended; or consent of instructor. Analysis of the distribution patterns of the vascular plant groups, and consideration of the factors which account for the present diversity of flora and vegetation.

Mr. Webster

155. Plant Microtechnique. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 116 or course 105. Introduction to practical laboratory methods in preparing plant materials for microscopic examination; special emphasis on paraffin and chromosome smear techniques; introduction to techniques of tissue culture and photomicrography. The Staff

180. Biological Evaluation of Herbicides. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 107 and 111 (may be taken concurrently). Principles dealing with the physical, chemical, and physiological aspects of herbicides. Laboratory, greenhouse and field studies illustrating these principles in herbicide evaluation; emphasis upon biological assays and upon the interpretation of biological data. Mr. Bayer

194H. Special Study for Honors Students. (1-5)

I, II, III.

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.

The Staff

198. Directed Group Study. (1-5) II.

Prerequisite: consent of instructor. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses***210. Cell Physiology-Protoplastemics. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of instructor. Selected plant physiological topics treated on the cellular level: water relations, plasmolytic phenomena, cytoplasmic movements, transport mechanisms, vital staining, responses of cells to high and low temperatures, wound reactions, effects of poisons. Microscopic techniques are stressed.

Mr. Currier

***211. Plant Cell Metabolism. (4) II.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: consent of instructor. Plant cell physiology, dealing particularly with the roles of plastids, mitochondria, microsomes, and nuclei in cellular metabolism. Isolation and study of these particulates, using centrifugation, gasometric, chromatographic, and spectroscopic methods. Detailed consideration of photosynthesis and respiration.

Mr. Stocking

***212. Physiology of Herbicidal Action. (3) I.**

Lecture—3 hours. Prerequisite: courses 107, 120A, 120B, 120C. A study of the fundamental processes involved in the physiological action of herbicides. Detailed consideration of the fate of herbicides in plants and soils.

Mr. Ashton

* Not to be given, 1968-69.

214. Mechanisms of Toxic Action. (3) II.

Lecture—3 hours. Prerequisite: Biochemistry 101A, 101B and consent of instructor. Biochemical and physiological mechanisms underlying toxicity and detoxification.

Mr. Castelfranco, Mr. Kilgore

215. Light and Plant Growth. (3) I.

Lecture—3 hours. Prerequisite: courses 120A, 120B, 120C; Physics 2B. Mechanisms and phenomena involved in the control of plant growth by light. Photoperiodism, photomorphogenesis, phototropism, and certain aspects of photosynthesis.

Mr. Bonner

***216. Advanced Morphology of Vascular Plants.**

(3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 116. Evolution of form, structure, and reproduction of fossil and extant types through Cycadophytes.

Mr. Gifford

218. Experimental Phycology. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 118. Special problems in development, physiology, and genetics using algae as experimental organisms. Topics to be investigated will be selected according to the interests of individual students.

Miss Lang

220. Plant Morphogenesis. (3) III.

Lecture—3 hours. Prerequisite: course 105 or 116; course 155 recommended. A survey of recent advances in the study of growth and the development of form, with special reference to higher plants, and some emphasis on experimental approaches.

Miss Cutter, Mr. Gifford

220L Plant Morphogenesis Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 220 (may be taken concurrently) and consent of the instructor. Procedures, principally experimental, used to study the development of plant form.

Miss Cutter, Mr. Gifford

221. Selected Topics in Plant Physiology. (2) I, II,

III.

Lecture—2 hours. Evaluation of the most recent research in plant physiology. Coverage of the entire field in a three-year period. Lectures and discussions by specialists in the areas of their research interests. May be repeated for credit.

The Staff

***231. Advanced Microtechnique. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: one of the following: course 105, 116, 130A; Zoology 107. Recommended: course 155 or Zoology 104. Autoradiography, thin sectioning, freeze drying, microscopy, Feulgen staining, cytospectrophotometry, and similar techniques. Laboratory work involving techniques of special interest to the student.

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***255. Principles of Plant Taxonomy. (5) I.**

Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: course 108;

Genetics 103. Evaluation of different approaches to biological classifications; theory of evolutionary classification; examples of how various disciplines—anatomy, embryology, biochemistry, paleontology, ecology—contribute to the elucidation of problems of taxonomic relationships, mainly of genera and higher categories.

Mr. Tucker

***256A. Experimental Plant Taxonomy. (2) II.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 108. Recommended: course 117; Genetics 103. The application of experimental techniques to the elucidation of taxonomic problems and evolutionary relationships in higher plants.

Mr. Kyhos

***256B. Experimental Plant Taxonomy. (2) III.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 256A. A continuation of course 256A. The 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.

Mr. Kyhos

257. Plant Autecology. (3) I.

Lecture—3 hours. Prerequisite: course 117, Mathematics 13. Evaluation of biotic and abiotic environmental factors in the distribution of plant species.

Mr. Major, Mr. Barbour

***258. Plant Syncrology. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 108, 117; Soil Science 120A recommended. Theories and techniques involved in the study of structure, composition, boundaries, ecology, and classification of vegetation, with particular emphasis on California plant communities.

Mr. Major

290. Seminar (1) I, II, III.

Seminar—1 hour.

The Staff

291. Seminar in Plant Morphology. (1) I, II, III.

Seminar—1 hour.

The Staff

292. Seminar in Plant Physiology. (1) I, II, III.

Seminar—1 hour.

The Staff

293. Seminar in Weed Science. (1) II.

Seminar—1 hour.

The Staff

294. Seminar in Cytology and Cytobiochemistry.

(1) III.

Seminar—1 hour. Survey of current research developments in the fields of cytology and biochemistry with special reference to plants. Discussion of the fine structure of cells in relation to biochemical function.

The Staff

299. Research. (1-9) I, II, III.

The Staff

* Not to be given, 1968-69.

CHEMISTRY

Raymond M. Keefer, Ph.D., *Chairman of the Department*

Department Office, 108 Chemistry Building

Professors:

- Thomas L. Allen, Ph.D.
- Lawrence J. Andrews, Ph.D.
- Robert K. Brinton, Ph.D.
- Raymond M. Keefer, Ph.D.
- Richard E. Kepner, Ph.D.
- Edgar P. Painter, Ph.D.
- Harold G. Reiber, Ph.D.
- Leo H. Sommer, Ph.D.
- David H. Volman, Ph.D.

Associate Professors:

- 'Albert T. Bottini, Ph.D.
- Gary E. Maciel, Ph.D.
- Charles P. Nash, Ph.D.
- George S. Zweifel, Sc.D.

Assistant Professors:

- Edwin C. Friedrich, Ph.D.
- George A. Gerhold, Ph.D.
- Kenneth G. Hancock, Ph.D.
- Rodney E. Harrington, Ph.D.
- Hakon Hope, Cand. Real.
- W. Kenneth Musker, Ph.D.
- Peter A. Rock, Ph.D.
- John W. Root, Ph.D.
- James H. Swinehart, Ph.D.
- James S. Vincent, Ph.D.

Major Subject Advisers.—Mr. Harrington, Mr. Kepner, Mr. Maciel, Mr. Painter, Mr. Rock, Mr. Swinehart, Mr. Vincent.

The Major Programs

Students who are interested in chemistry as a profession should elect the program leading to the Bachelor of Science degree, which meets the standards recommended by the American Chemical Society for professional training in chemistry. Students desiring a less intensive program in chemistry or wishing to emphasize biochemistry should elect the program leading to the Bachelor of Arts degree. High school students should note that the preparation for either degree is simplified if their high school programs include chemistry and four years of mathematics.

Candidates for the bachelor's degree in chemistry will receive upper division credit for those lower division chemistry courses accepted in lieu of upper division courses required for the major.

Bachelor of Science Major Program

Lower Division Courses.—Required: Chemis-

¹ Absent on leave, 1968-69.

try 1A, 1B, 1C, 5 or 1A, 7A, 7B; Physics 4A, 4B, 4C, 4D, 4E; Mathematics 11, 21A, 21B, 21C, 22B, and either 22A or 22C; and a reading knowledge of German.

Upper Division Courses.—Required: Chemistry 105A, 105B, 110A, 110B, 110C, 111, 112A, 112B, 112C, and 8 units of any additional courses in chemistry (one of which must include laboratory work) except Chemistry 109A or 109B.

Bachelor of Arts Major Program.

Lower Division Courses.—Required: Chemistry 1A, 1B, 1C, 5 or 1A, 7A, 7B; Physics 2A, 2B, 2C, 3A, 3B, 3C; Mathematics 11, 21A, 21B, 21C, or 16A, 16B, 16C.

Upper Division Courses.—Required: 36 units in chemistry, biochemistry, or physics, including Chemistry 110A, 110B, 110C, 112A, 112B, and 112C or 112E.

Honors and Honors Program (see page 113).—The honors program comprises 6 units of course 194H.

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.

Teaching Major.—The teaching major is satisfied by either the A.B. or B.S. major in chemistry.

Teaching Minor.—Chemistry 1A, 1B, 1C, 5, 8A, 8B, 9, 109A, 109B. With the approval of the representative some substitution may be permitted.

Subject Representative: Mr. Nash

Lower Division Courses

1A. General Chemistry. (5) I, II.

Lecture—3 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: high school chemistry; or high school physics and three years of high school mathematics (with an average grade of B or higher); or second-quarter standing. Fundamental principles of chemistry. Stoichiometry, properties and theory of gases, first law of thermodynamics, atomic and molecular structure, colligative properties of solutions.

The Staff

(I. Mr. Keefer, Mr. Allen, and
Mr. Vincent in charge;
II. Mr. Maciel in charge)

1B. General Chemistry. (5) II, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 1A. Continuation of course 1A. Chemical equilibria, oxidation-reduction

processes, electrochemistry, introduction to qualitative analysis.

(II. Mr. Allen and Mr. Volman in charge;
III. Mr. Brinton in charge)

1C. General Chemistry. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 1B. Continuation of course 1B. Chemical kinetics, structures and reactions of complex ions and molecules, application of principles of chemistry to problems of qualitative analysis.

(Mr. Gerhold and Mr. Musker in charge)

5. Quantitative Analysis. (4) I, III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 1C with grade of C or higher. Not open to students who have credit for Chemistry 7B. An introduction to the principles and methods of quantitative chemical analysis, with emphasis on the application of equilibrium theory to analytical problems.

I. ———, III. ———

7A. General Chemistry. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 1A, Mathematics 21A or 16A (may be taken concurrently). Enrollment to be limited. Admission based on performance in course 1A. The fundamental principles of chemistry with emphasis in the laboratory on quantitative work. Courses 1A–7A–7B are equivalent to the sequence Chemistry 1A–1B–1C–5 as a prerequisite for further courses in chemistry.

Mr. Nash

7B. General Chemistry. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 7A. Continuation of course 7A.

8A. Organic Chemistry, Brief Course. (3) I, III.

Lecture—3 hours. Prerequisite: course 1B or 7A 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.

I. Mr. Sommer, Mr. Reiber

†8B. Organic Chemistry, Brief Course. (3) I, II.

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.

9. Methods of Organic Chemistry. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 8B. Emphasis is placed on a study of the basic experimental techniques of organic synthesis.

Mr. Kepner

Upper Division Courses

105A–105B. Advanced Quantitative Analysis. (3–3) II, III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 109B or 110C (may be taken concurrently). Instrumental methods of analysis, emphasizing chromatographic, electrochemical, and spectrophotometric techniques.

II. Mr. Swinehart, III. Mr. Hope

109A. Physical Chemistry, Brief Course. (2) I.

Lecture—2 hours. Prerequisite: course 5 or 7B; or consent of instructor; Mathematics 21C and 11 or equivalent, or 16C; one year of college physics. Special topics in physical chemistry, with emphasis on spectroscopy, molecular structure, and principles of chemical thermodynamics. Intended for students majoring in areas other than chemistry. Mr. Harrington

109B. Physical Chemistry, Brief Course. (3) II.

Lecture—3 hours. Prerequisite: course 109A or 110A. Continuation of course 109A, with emphasis on equilibrium, electrochemistry, and chemical kinetics.

Mr. Hope

110A. Physical Chemistry. (3) I, III.

Lecture—3 hours. Prerequisite: course 5 or 7B; Mathematics 21C and 11 or equivalent, or 16C; one year of college physics. A development of the principles of classical thermodynamics; emphasis on criteria for the existence and maintenance of equilibrium.

I. Mr. Brinton, Mr. Rock; III. Mr. Volman

110B. Physical Chemistry. (3) I, II.

Lecture—3 hours. Prerequisite: course 110A. Continuation of course 110A, with emphasis on solution thermodynamics, kinetic theory, and chemical kinetics.

I. Mr. Root, II. Mr. Keefer, Mr. Harrington

110C. Physical Chemistry. (3) II, III.

Lecture—3 hours. Prerequisite: course 110B. Continuation of course 110B. Atomic and molecular structure and spectra; the relation between molecular and thermodynamic properties.

II. Mr. Gerhold; III. Mr. Allen, ———

111. Physical Chemistry. (4) I, III.

Lecture—1 hour; laboratory—9 hours. Prerequisite: course 109B or 110C (may be taken concurrently). Physicochemical measurements and laboratory experiments illustrating some of the important principles of physical chemistry.

I. Mr. Nash; III. ———

112A. Organic Chemistry. (5) II, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 1C or 7B with a grade of C or higher. Introduction to the basic concepts of organic chemistry; the chemistry of hydrocarbons. Designed primarily for majors in chemistry.

II. Mr. Zweifel; III. ———

† Not to be given, fall quarter 1968.

112B. Organic Chemistry. (5) I, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 112A or 8B and 9. Continuation of course 112A 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.

I. Mr. Zweifel; III. ———

112C. Organic Chemistry. (5) I, II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 112B. Continuation of course 112B with emphasis on enolate condensations and the chemistry of amines and phenols; selected biologically important compounds.

I. Mr. Kepner; II. Mr. Friedrich

112D. Organic Chemistry. (3) I, III.

Lecture—3 hours. Prerequisite: course 112A or 8 and 9; and consent of instructor. Equivalent to the lecture part of 112B. Intended primarily for students in fields other than chemistry.

I. Mr. Zweifel; III. ———

112E. Organic Chemistry. (3) I, II.

Lecture—3 hours. Prerequisite: course 112B or 112D; and consent of instructor. Equivalent to the lecture part of 112C. Intended primarily for students in fields other than chemistry.

I. Mr. Kepner; II. Mr. Friedrich

121. Introduction to Molecular Structure and Spectra. (4) III.

Lecture—4 hours. Prerequisite: course 110C. Modern theoretical and experimental methods used to study problems of molecular structure and binding; emphasis on spectroscopic techniques.

Mr. Vincent

124. Advanced Inorganic Chemistry. (4) I.

Lecture—4 hours. Prerequisite: course 109B or 110C; 112C or 112E. Modern interpretations of bonding, structure, and reactivity of inorganic compounds; emphasis on the chemistry of the first- and second-row elements and transition metals.

Mr. Swinehart

124L. Advanced Inorganic Chemistry Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 124. Synthesis and characterization of inorganic compounds.

Mr. Musker

126. Nuclear Chemistry. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 110B (may be taken concurrently with consent of the instructor). Introduction to experimental and theoretical nuclear chemistry including nuclear properties, nuclear spectroscopy, radiation effects, radioactive decay, and nuclear reactions. Both the lectures and the laboratory stress applications of nuclear phenomena in chemistry.

Mr. Root

130. Qualitative Organic Analysis. (4) III.

Lecture—1 hour; laboratory—9 hours. Prerequisite: course 5 or 7B; 112C or 112E. The application of physical and chemical techniques to the qualitative identification of organic compounds.

Mr. Friedrich

131. Advanced Organic Chemistry. (4) II.

Lecture—4 hours. Prerequisite: course 109B or 110B; 112C or 112E. Application of current knowledge of reaction mechanisms and molecular structure to problems of organic synthesis.

150A. Chemistry of Natural Products. (3) I.

Lecture—3 hours. Prerequisite: courses 109B and 112C or 112E, or consent of the instructor. Chemistry of carbohydrates and lipids; structure proof, stereochemistry, conformation, substitutions, and rearrangements of model systems.

Mr. Painter

150B. Chemistry of Natural Products. (3) II.

Lecture—3 hours. Prerequisite: courses 109B and 112C or 112E, or consent of the instructor. Structure, reactions, and physical properties of proteins, amino acids, nucleic acids, and related nitrogen compounds.

Mr. Painter

194H. Undergraduate Research. (2-5) I, II, III.

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.

The Staff

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

Prerequisite: consent of the instructor based upon adequate preparation in chemistry, mathematics, and physics.

The Staff

Graduate Courses**204. Chemical Kinetics. (3) III.**

Lecture—3 hours. Basic theories describing rate processes, with special emphasis on the interpretation of activation parameters. An intensive study of the relationship between rate law and mechanism.

Mr. Swinehart

205. Quantum Chemistry I. (3) II.

Lecture—3 hours. Introduction to quantum chemistry, with emphasis on molecular electronic structure.

Mr. Vincent

206. Quantum Chemistry II. (3) III.

Lecture—3 hours. Prerequisite: course 205. A quantum mechanical description of the fundamental nature of the interaction between electromagnetic radiation and matter, emphasizing molecular spectroscopy; consideration of vibrational, rotational, electronic, and magnetic aspects. Offered in even-numbered years.

Mr. Gerhold

207. Quantum Chemistry III. (3) III.

Lecture—3 hours. Prerequisite: course 205. An advanced course in the quantum theory of molecular electronic structure. Offered in odd-numbered years. Mr. Maciel

214. Chemical Thermodynamics. (4) I.

Lecture—4 hours. Development of thermodynamic relations; applications to chemical systems. Mr. Volman

215. Advanced Physical Chemistry—Statistical Methods. (3) III.

Lecture—3 hours. Prerequisite: course 214. Probability and statistical methods; introduction to partition functions and statistical thermodynamics; heat capacities; chemical equilibrium; statistical theory of reaction rates; liquids and solutions; matter in fields. Mr. Nash

216. Statistical Thermodynamics. (3) I.

Lecture—3 hours. Prerequisite: course 215. Development of the laws of molecular assemblies; ensemble theory; fluctuations; imperfect gases; quantum effects; cooperative phenomena. Offered in even-numbered years.

Mr. Harrington

220. Organic Chemistry. (3) II.

Lecture—3 hours. Selected topics of current interest concerning the structure and synthesis of naturally-occurring organic compounds. Offered in odd-numbered years.

221. Organic Chemistry. (3) III.

Lecture—3 hours. Selected topics of current interest concerning the synthesis and reactions of heterocyclic compounds. Offered in even-numbered years. Mr. Friedrich

222. Organic Chemistry. (3) II.

Lecture—3 hours. Selected topics of current interest concerning the synthesis and reactions of small-ring compounds. Offered in even-numbered years. Mr. Bottini

CHINESE—See Oriental Languages**CLASSICS**

Department Office, 622 Sproul Hall

Associate Professors:

Richard E. Grimm, Ph.D.
Wesley E. Thompson, Ph.D.

Assistant Professor:

Frederick H. van Doorninck, Ph.D.

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Lecturer:

H. Phelps Gates, Jr., B.A., M.A.

223. Organometallic Compounds. (3) III.

Lecture—3 hours. Selected topics concerning the preparation and utilization of organometallic compounds in organic synthesis, including the application of metal hydrides as reducing agents. Offered in odd-numbered years.

Mr. Zweifel

224. Inorganic Chemistry. (3) III.

Lecture—3 hours. Prerequisite: course 124. A development of the modern theories related to the structural, optical, and magnetic properties of inorganic compounds and complexes. Offered in odd-numbered years. Mr. Swinehart

225. Inorganic Chemistry. (3) III.

Lecture—3 hours. Prerequisite: course 124. Application of kinetic and thermodynamic principles to the interpretation of inorganic systems. Offered in even-numbered years. Mr. Musker

226. Advanced Nuclear Chemistry. (3) III.

Lecture—3 hours. Prerequisite: courses 126 and 205 or consent of the instructor. Detailed discussion of nuclear models, decay processes, nuclear reactions, and interaction of radiations with matter with emphasis on chemical applications. Offered in odd-numbered years. Mr. Root

233A–233B. Physical Organic Chemistry. (2-2) I–II.

Lecture—2 hours. Modern concepts of substitution, elimination, and addition reactions, rearrangements, and stereochemistry.

Mr. Andrews

290. Seminar. (1) I, II, III.

Seminar—1 hour. Prerequisite: consent of the instructor. Mr. Sommer, Mr. Gerhold

298. Group Study. (1-5) I, II, III.**299. Research. (1-12) I, II, III.**

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.

The Staff

Honors and Honors Program (see page 113).—The honors program comprises two quarters of study under course 104H, which will include a research paper and a comprehensive examination.

The Major Program—Latin

Lower Division Courses.—Required: Latin 1, 2, 3, 4, and 5 or their equivalents.

Upper Division Courses.—Required: at least 36 units of upper division courses, including 121A–121B–121C.

Honors and Honors Program (see page 113).

—The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—Requirements for the teaching minor in Latin: Latin 1, 2, 3, 4, 5 or their equivalents; at least 18 units of upper division work, including Latin 121A–121B–121C. Recommended: History 111C.

Subject Representative: Mr. Grimm

The Master of Arts Degree

The Department offers courses leading to the M.A. degree in Classics to students who have completed with distinction the A.B. degree in Classics, or its equivalent. Candidates will be recommended for admission to graduate studies in Classics provided they meet the requirements of the Graduate Division and the Department of Classics. Detailed information may be obtained by writing to the Graduate Adviser, Department of Classics.

Graduate Adviser: Mr. Thompson

Classics

Lower Division Courses

***10. Greek and Roman Mythology. (3) I.**

Lecture—3 hours. Origin and development of myths and legends, their place in the religion, literature, and art of Greece and Rome.

17A–17B. Greek Archaeology. (3–3) I–II.

Lecture—3 hours. The development of Greek civilization as illustrated by the monuments.

Mr. van Doorninck

17C. Roman Archaeology. (3) III.

Lecture—3 hours. The development of Rome and its Empire as illustrated by the monuments.

Mr. van Doorninck

Upper Division Courses

139A. Greek Literature in Translation. (4) I.

Lecture—3 hours. The Homeric epic and fifth-century drama. Reading of the *Iliad*, *Odyssey*, and selected plays of Aeschylus, Soph-

ocles, and Euripides. Lectures on the early Greek epic and classical Athenian drama.

Mr. Gates

139B. Greek Literature in Translation. (3) II.

Lecture—3 hours. The development of historical writing in Greece: Herodotus, Thucydides, and selections from the minor historians. Offered in even-numbered years. Mr. Thompson

***140. Latin Literature in Translation. (4) II.**

Lecture—3 hours. Prerequisite: English 1. Readings in Plautus, Terence, Lucretius, Roman lyric poets, Vergil, Livy, Seneca, Petronius, Tacitus, and Juvenal. Lectures on Roman literary history from Ennius to the late Empire. Offered in odd-numbered years.

141. Greek and Roman Comedy. (4) II.

Lecture—3 hours. Readings in Aristophanes, Menander, Plautus, and Terence; lectures on the development of ancient comedy. Offered in odd-numbered years.

Mr. Grimm

150. Athenian Political and Social Institutions.

(3) III.

Lecture—2 hours; discussion—1 hour. Politics and government, marriage and kinship, religious societies, and the demographic and economic basis of Athenian democracy. Offered in odd-numbered years.

Mr. Thompson

Greek

Departmental Major Adviser: Mr. Thompson

Lower Division Courses

1. Elementary Greek. (5) I.

Lecture—4 hours. Mr. van Doorninck

2. Elementary Greek. (5) II.

Lecture—4 hours. Prerequisite: course 1. A continuation of course 1. Mr. van Doorninck

3. Elementary Greek. (5) III.

Lecture—4 hours. Prerequisite: course 2. A continuation of course 2. Mr. van Doorninck

Upper Division Courses

***100. Attic Orators. (4) I.**

Lecture—3 hours. Prerequisite: course 3. Mr. Thompson

101. Plato. (4) I.

Lecture—3 hours. Prerequisite: course 3. Mr. Grimm

***102. Euripides. (4) II.**

Lecture—3 hours. Prerequisite: course 101. Mr. Gates

* Not to be given, 1968–69.

103. Homer. (4) III.

Lecture—3 hours. Prerequisite: course 102.
Mr. Gates

***111. Sophocles. (4) III.**

Lecture—3 hours. Prerequisite: course 103.
Offered in odd-numbered years. Mr. Grimm

***112. Aristophanes. (4) II.**

Lecture—3 hours. Prerequisite: course 103.
Offered in even-numbered years. Mr. Grimm

***113. Thucydides. (4) I.**

Lecture—3 hours. Prerequisite: course 103.
Offered in even-numbered years. Mr. Thompson

***114. Lyric Poetry. (4) I.**

Lecture—3 hours. Prerequisite: course 103.
Offered in even-numbered years. Mr. Grimm

***115. Aeschylus. (4) II.**

Lecture—3 hours. Prerequisite: course 103.
Offered in odd-numbered years. Mr. Grimm

116. Herodotus. (4) II.

Lecture—3 hours. Prerequisite: course 103.
Offered in odd-numbered years.
Mr. Thompson

120A-120B. Greek Composition. (2-2) II-III.

Lecture—2 hours. Prerequisite: course 103.
Mr. Thompson

194H. Special Study for Honors Students. (5)

I, II, III.

Prerequisite: open only to honor students.
The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Latin

Departmental Major Adviser.—Mr. Grimm.

Lower Division Courses**1. Elementary Latin. (4) I.**

Lecture—4 hours. The Staff

2. Elementary Latin. (4) II.

Lecture—4 hours. Prerequisite: course 1. A
continuation of course 1. The Staff

3. Elementary Latin. (4) III.

Lecture—4 hours. Prerequisite: course 2. A
continuation of course 2. The Staff

4. Intermediate Latin. (3) I.

Lecture—3 hours. Prerequisite: course 3 or
equivalent. The Staff

5. Intermediate Latin. (3) II.

Lecture—3 hours. Prerequisite: course 4 or
equivalent. Continuation of course 4. The Staff

* Not to be given, 1968-69.

Upper Division Courses***101. Livy. (4) I.**

Lecture—3 hours. Prerequisite: course 5. Of-
fered in odd-numbered years. Mr. Thompson

***102A. Plautus. (4) II.**

Lecture—3 hours. Prerequisite: course 5.
Offered in even-numbered years. _____

102B. Terence. (4) I.

Lecture—3 hours. Prerequisite: course 5.
Offered in even-numbered years. _____

***103. Vergil: Aeneid. (4) III.**

Lecture—3 hours. Prerequisite: course 5. Of-
fered in even-numbered years. Mr. Gates

***104. Sallust. (4) I.**

Lecture—3 hours. Prerequisite: course 5. Of-
fered in even-numbered years. Mr. Thompson

***105. Catullus. (4) II.**

Lecture—3 hours. Prerequisite: course 5. Of-
fered in odd-numbered years. Mr. Thompson

***106. Horace: Odes and Epodes. (4) III.**

Lecture—3 hours. Prerequisite: course 5. Of-
fered in odd-numbered years. Mr. Grimm

108. Horace: Satires and Epistles. (4) II.

Lecture—3 hours. Prerequisite: course 5. Of-
fered in odd-numbered years. Mr. Grimm

109. Roman Elegy. (4) III.

Lecture—3 hours. Prerequisite: course 5. Of-
fered in odd-numbered years. Mr. Grimm

***111A-111B-111C. Silver Age Latin. (4) I, II, III.**

Lecture—3 hours. Prerequisite: course 5. Se-
lections from Tacitus, Pliny, Petronius Juvenal,
Martial, and other writers of the Silver Age.
Offered in odd-numbered years. Mr. Grimm

***114. Cicero: Philosophical Works. (4) I.**

Lecture—3 hours. Prerequisite: course 5. Of-
fered in odd-numbered years. _____

***115. Lucretius. (4) II.**

Lecture—3 hours. Prerequisite: course 5. Of-
fered in even-numbered years. Mr. Gates

***116. Vergil: Eclogues and Georgics. (4) III.**

Lecture—3 hours. Prerequisite: course 5. Of-
fered in even-numbered years. Mr. Grimm

***121A-121B-121C. Latin Composition. (2) I, II, III.**

Lecture—2 hours. Prerequisite: course 5. Sur-
vey of classical Latin syntax; extensive prac-
tice in prose composition. Offered in odd-num-
bered years. Mr. Grimm

194H. Special Study for Honors Students. (5)

I, II, III.

Prerequisite: open only to honors students.
Guided research leading to an honors paper.

The Staff

199. Special Study for Advanced Undergraduates. (2-5) I, II, III.	The Staff	study of the Sanskrit language; analysis of its structure and history. Offered in even-numbered years.
Graduate Courses		Mr. Gates
201. Introduction to Classical Philology. (4) I. Seminar—3 hours.	Mr. Thompson	Discussion—3 hours. Prerequisite: course 191. Continuation of course 191. Offered in odd-numbered years.
202. Lucretius. (4) II. Seminar—3 hours.	Mr. Gates	Mr. Gates
203. Vergil. (4) III. Seminar—3 hours.	Mr. Grimm	Discussion—3 hours. Prerequisite: course 192. Continuation of course 192. Offered in odd-numbered years.
*299. Research. (2-5) I, II, III.	The Staff	Mr. Gates

Sanskrit

Upper Division Courses

191. Elementary Sanskrit. (4) I.

Discussion—3 hours. Introduction to the

CLINICAL PATHOLOGY

Oscar W. Schalm, D.V.M., Ph.D., *Chairman of the Department*

Department Office, 1163 Haring Hall

Professors:'Donald E. Jasper, D.V.M., Ph.D.
Oscar W. Schalm, D.V.M., Ph.D.**Associate Professor:**

Jiro J. Kaneko, D.V.M., Ph.D.

Assistant Professor:

Nemi C. Jain, M.V.Sc., Ph.D.

◊ ◊ ◊

Lecturer:

Edward J. Carroll, B.S., M.S., Ph.D.

Upper Division Course

199. Special Study for Undergraduates. (1-4)

I, II, III.

The Staff

Graduate Courses**201. Clinical Hematology.** (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: third-year standing in the School of Veterinary Medicine or consent of the instructor. Hematological techniques and interpretation as applied to the study of disease in animals.

Mr. Schalm, Mr. Jain

202. Clinical Biochemistry. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: third-year standing in School of Veterinary Medicine or consent of the instructor. Biochemical methods in the diagnosis of disease. Special emphasis on electrolyte balance, liver

function, kidney function, urinalysis, osteological diseases, thyroid function, and disorders of carbohydrate, protein, and lipid metabolism.

Mr. Kaneko, Mr. Jasper

***203. Biochemistry of Metabolic Diseases.** (3) II.

Lecture—3 hours. Prerequisite: biochemistry and physiology or consent of the instructor. The biochemistry of inborn and acquired errors of metabolism in animals and man. Offered in even-numbered years.

Mr. Kaneko

204. Morphological Hematology. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: consent of the instructor. Morphological and interpretive clinical hematology for graduate students.

Mr. Schalm, Mr. Jain

250A-250B-250C. Clinical Pathology Laboratory.

(1-1-1) I-II-III.

Prerequisite: fourth-year standing in School of Veterinary Medicine. Application of laboratory methods to the diagnosis of animal disease.

The Staff

***261. The Bovine Mammary Glands in Health and Disease.** (2) II.

Lecture—2 hours; two 2-hour laboratory sessions. Prerequisite: consent of instructor. Ontogeny, embryology, anatomy and physiology of the mammary glands; relationship of mastitis and milk quality; infectious causes and the influence of environment, milking machines and management on mastitis; pathogenesis of mas-

* Not to be given, 1968-69.

† Absent on leave, 1968-69.

titis; cellular and humoral defense mechanisms; mastitis diagnosis and control.

Mr. Jasper, Mr. Schalm

290. Seminar in Clinical Pathology. (1) I, II, III.

Seminar—1 hour.

The Staff

CLINICAL SCIENCES

R. M. Cello, D.V.M., *Chairman of the Department*

Department Office, 1315 Haring Hall

Professors:

Robert M. Cello, D.V.M.

John P. Hughes, D.V.M.

John W. Kendrick, D.V.M., Ph.D.

Blaine McCowan, Jr., D.V.M.

William R. Pritchard, D.V.M., Ph.D., J.D.

Edward A. Rhode, Jr., D.V.M. (*Clinical Sciences and Animal Physiology*)

*John D. Wheat, D.V.M.

Associate Professors:

Murray E. Fowler, D.V.M.

Jack A. Howarth, D.V.M., Ph.D.

Robert L. Leighton, D.V.M.

Gordon H. Theilen, D.V.M.

Assistant Professors:

John C. Bartley, D.V.M., Ph.D.

Gary O. Ewing, D.V.M.

Jerry R. Gillespie, D.V.M., Ph.D.

Charles A. Hjerpe, D.V.M.

Terrell A. Holliday, D.V.M., Ph.D.

Ronald D. Schechter, D.V.M.

John W. Switzer, D.V.M.

Bud C. Tennant, D.V.M.



Professor:

Joseph P. Morgan, D.V.M. (*Acting*)

Lecturers:

Alfred G. Edward, D.V.M. (*Laboratory—Animal Medicine*)

Charles E. Grayson, M.D. (*Radiology*)

Sigmund T. Rich, D.V.M.

Elmer J. Shabart, M.D. (*Veterinary Surgery*)

Alida P. Wind, D.V.M.

Lower Division Course

10. Introduction to Biomedical Terminology. (2) III.

Lecture—1 hour; discussion—1 hour. An introduction to the basic terminology of animal biology and medicine, with practice in term analysis.

298. Directed Group Study. (1–3) I, II, III. The Staff

299. Research in Clinical Pathology. (1–9) I, II, III.

The Staff

Upper Division Courses

103. Introductory Medicine. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Pathology 122B and Physiological Sciences 140B. Lectures on the principles of clinical diagnosis of animal diseases, with special emphasis on history taking and identification and interpretation of symptoms. The laboratory will provide practice in physical examination of normal and abnormal animals.

Mr. Rhode

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

The Staff (Mr. Rhode in charge)

Graduate Courses

202. Laboratory Animal Hygiene. (2) I.

Lecture—2 hours; discussion—1 hour. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Lectures and discussion of the principles of animal facility design, husbandry and legal aspects of laboratory animal care.

Mr. Edward, Mr. Rich, Mr. Bustad

204A. Medicine (3) I.

Lecture—3 hours. Prerequisite: course 103. A study of the medical diseases of domestic animals.

The Staff (Mr. Ewing in charge)

204B. Medicine. (4) II.

Lecture—4 hours. Prerequisite: course 204A. A study of the medical diseases of domestic animals.

The Staff (Mr. Howarth in charge)

204C. Medicine. (3) III.

Lecture—3 hours. Prerequisite: course 204B. A study of the medical diseases of domestic animals.

The Staff (Mr. Tennant in charge)

204D. Medicine. (5) I.

Lecture—5 hours. Prerequisite: course 204C. A study of the medical diseases of domestic animals.

The Staff (Mr. Rhode in charge)

^a Absent on leave, fall quarter 1968.

204E. Medicine. (3) II.

Lecture—3 hours. Prerequisite: course 204D. A study of the medical diseases of domestic animals. The Staff (Mr. Holliday in charge)

204F. Medicine. (3) III.

Lecture—3 hours. Prerequisite: course 204E. A study of the medical diseases of domestic animals. The Staff (Mr. Bartley in charge)

205. Advanced Veterinary Clinical Neurology. (1) III.

Laboratory—2 hours. Prerequisite: senior standing in the School of Veterinary Medicine or consent of the instructor. Extension of neurology portions of courses 204 and 250. Some special techniques of neurological examination, electroencephalography, electromyography, and neuroradiography. Discussions emphasizing the anatomical, physiological, and pathological basis of the techniques and interpretation of the results.

Mr. Holliday

206. Clinical Oncology. (2) II.

Lecture—1 hour; laboratory—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. A study of neoplastic diseases of animals. Mr. Theilen

208. Advanced Small Animal Surgery. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. A comprehensive review of the surgical diseases encountered with particular attention to those of the cat. Illustrated by slides, demonstrations, and current cases from the Veterinary Medical Teaching Hospital.

Mr. Leighton

209. Reproduction in the Equine. (1) II.

Lecture—1 hour. Prerequisite: senior standing in the School of Veterinary Medicine or consent of instructor. A discussion of special problems of equine reproduction with emphasis on methods of diagnosis and the interpretation of clinical and laboratory findings. Mr. Hughes

210A. Medical Rounds. (1) I.

Discussion—2 hours. Prerequisite: course 103. Discussion of selected cases from the clinic. The Staff (Mr. Holliday in charge)

210B. Medical Rounds. (1) II.

Discussion—2 hours. Prerequisite: course 204A. Discussion of selected cases from the clinic. The Staff (Mr. Holliday in charge)

210C. Medical Rounds. (1) III.

Discussion—2 hours. Prerequisite: course 204B. Discussion of selected cases from the clinic. The Staff (Mr. Holliday in charge)

211A. Medical Rounds in Laboratory Animal Medicine. (1) I.

Discussion—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or

consent of instructor. Cases from the campus Experimental Animal Resource Facility as well as the Primate Center and Radiobiology Laboratory will be selected for discussion of history, interpretation of symptoms, treatment and disposition. The Staff (Mr. Edward in charge)

211B. Medical Rounds in Laboratory Animal Medicine. (1) II.

Discussion—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Cases from the campus Experimental Animal Resource Facility as well as the Primate Center and Radiobiology Laboratory will be selected for discussion of history, interpretation of symptoms, treatment and disposition. The Staff (Mr. Edward in charge)

211C. Medical Rounds in Laboratory Animal Medicine. (1) III.

Discussion—2 hours. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Cases from the campus Experimental Animal Resource Facility as well as the Primate Center and Radiobiology Laboratory will be selected for discussion of history, interpretation of symptoms, treatment and disposition. The Staff (Mr. Edward in charge)

212. Special Problems in Bovine Medicine. (1) II.

Lecture—1 hour. Prerequisite: senior standing in School of Veterinary Medicine or consent of instructor. Economics and husbandry practices of the California cattle-feeding industry are outlined. Potential contributions by the practicing veterinarian to the success of the individual cattlefeeder are explored, with emphasis on the "herd approach" and disease prevention.

Mr. Hjerpe

220. Introductory Surgery. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Pathology 122C, Physiological Sciences 140B. Principles of surgery and surgical technique.

Mr. Leighton, Miss Wind

221. Large Animal Surgery. (5) II.

Lecture—5 hours. Prerequisite: course 220. Surgical diseases of large animals. Mr. Wheat

222. Small Animal Surgery. (5) III.

Lecture—5 hours. Prerequisite: course 220. Surgical diseases of small animals.

Miss Wind, Mr. Leighton

230. Reproduction, Genital Diseases and Obstetrics. (6) I.

Lecture—5 hours; laboratory—3 hours. Prerequisite: Pathology 122C, Physiological Sciences 140B. A course in the diagnosis, treatment, and control of diseases affecting the reproductive organs; the normal and disturbed physiology of reproduction; and obstetrics.

Mr. Kendrick

249. Clinics. (Summer) (2-7).

Diagnosis and treatment of animal diseases. Students are responsible for case records, care of patients, physical examinations, and participation in surgery. Laboratory exercises in restraint, diagnostic and therapeutic procedures and surgical techniques.

The Staff (Mr. Cello in charge)

250A. Clinics. (8) I.

Laboratory—24 hours. Prerequisite: courses 204C, 220, 230, 260.

The Staff (Mr. Cello in charge)

250B. Clinics. (8) II.

Laboratory—24 hours. Prerequisite: courses 204C, 220, 230, 260.

The Staff (Mr. Cello in charge)

250C. Clinics. (7) III.

Laboratory—21 hours. Prerequisite: courses 204C, 220, 230, 260.

The Staff (Mr. Cello in charge)

COMPARATIVE BIOCHEMISTRY (A Graduate Group)

Jack Preiss, Ph.D., *Chairman of the Group*

Group Office, 578 Hutchison Hall

Graduate Study.—The Graduate Group in Comparative Biochemistry offers programs of study and research leading to the M.A. and Ph.D. degrees in comparative biochemistry. For detailed information regarding graduate study in comparative biochemistry address the graduate adviser in comparative biochemistry.

260. Radiology. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: courses 103, 220. The physics and practical operation of x-ray and fluoroscopic equipment; the development and interpretation of radiographs, radiation therapy, and radiobiology.

Mr. Morgan

270. Jurisprudence and Law for the Veterinarian.

(1) II.

Lecture—1 hour. Prerequisite: senior standing in the School of Veterinary Medicine or consent of the instructor. The student is introduced to the principles of veterinary medical jurisprudence and the legal concepts pertinent to professional activities.

Mr. Pritchard

290. Seminar in Veterinary Medicine. (1) I, II, III.

The Staff (Mr. Tennant in charge)

298. Group Study. (1-2) I, II, III.

The Staff (Mr. Cello in charge)

299. Research. (1-9) I, II, III.

The Staff (Mr. Cello in charge)

Graduate Courses

290. Seminar. (1) I, II, III.

Prerequisite: consent of instructor.

Seminar—1 hour.

The Staff

299. Research (1-9) I, II, III.

The Staff

CONSUMER ECONOMICS—See Family and Consumer Sciences

DESIGN—See Family and Consumer Sciences

DRAMATIC ART

Theodore J. Shank, Ph.D., *Chairman of the Department*

Department Office, 220 Dramatic Art

Professor:

Theodore J. Shank, Ph.D.

Associate Professors:

¹Everard d'Harmoncourt, Ph.D.

Daniel E. Snyder

Alan A. Stambusky, Ph.D.

Assistant Professors:

Gene A. Chesley, M.A.

Douglas McDermott, Ph.D.

Alfred A. Rossi, Ph.D.

Robert K. Sarlos, Ph.D.

Lecturer:

David P. Wyatt, B.A.

Associate:

Howard J. Poyourow, M.A.

Major Advisers.—Mr. Stambusky, Mr. McDermott.

Lower Division Courses.—Twenty-four quarter units in Dramatic Art consisting of the following: 10A, 10B, 10C (Principles of Acting); 20 (Introduction to Dramatic Art); 24 (Visual

¹Absent on leave, 1968-69.

²Absent on leave, fall quarter 1968.

Aspects of Dramatic Art); and 27 (Creative Principles of Dramatic Art).

Upper Division Courses.—Thirty-eight quarter units in Dramatic Art including the following: 124A, 124B (Principles of Theatrical Design); 127A (Principles of Directing); 158A, 158B (World Drama); 159 (Contemporary Drama); 160A (Principles of Playwriting); either 127B (Principles of Directing) or 160B (Principles of Playwriting).

In exceptional cases, with the adviser's consent, the student may petition to substitute up to 8 units from other Dramatic Art courses for any of the above courses.

To qualify for graduation, each major student will be required to pass a comprehensive examination in Dramatic Art, administered during the third quarter of the student's senior year. In some instances, with the adviser's consent, the student may petition to substitute a thesis for part or all of the comprehensive examination. The thesis may be based upon a research project or upon a creative project in acting, design, directing, or playwriting.

In addition each major student is required to participate in departmental dramatic productions.

Teaching Major.—The requirements for the teaching major are the same as for the undergraduate major.

Teaching Minor.—At least 30 quarter units, including Dramatic Art 10A, 10B, 20, and 24; and 127A–127B and two courses from the sequence 158A, 158B, 159. Participation in departmental dramatic productions is recommended.

Subject Representative: Mr. Stambusky.

Master of Arts Degree

Graduate Adviser.—Mr. d'Harnoncourt

Candidates who meet the requirements of the Graduate Division and the Department of Dramatic Art will be admitted to graduate studies. After admission, students will be required to complete a background examination in Dramatic Art.

Candidates for the degree must complete the following requirements:

1. At least one graduate course in each of the following groups:

Group A: Dramatic Art 230, 232, 234, 235, 240, 242, 244.

Group B: Dramatic Art 250, 259, 265.

Group C: Dramatic Art 210, 224A, 224B, 227, 228, 260.

Group D: Dramatic Art 280, 299.

2. Graduate students who lack experience in some phase of dramatic production will be given assignments to make up their deficiencies. Beyond this, student participation, while highly encouraged, is voluntary.

3. A reading knowledge of French or German (or another language approved by the Department). Demonstration of the student's ability to apply his knowledge of that language in a gradu-

ate course will satisfy the foreign language requirement.

4. The requirements of one of the following plans must be fulfilled:

Plan I

Candidates must complete a minimum of 30 units of upper division and graduate courses in Dramatic Art and allied fields, take an oral examination lasting not less than two hours, and submit a thesis that has been approved by the faculty committee in charge. The thesis may be of either type described below:

The Creative Thesis records an artistic accomplishment involving research and public performance in one of the following areas: Acting, Design, Directing, or Playwriting.

The Research Thesis presents the results of a historical or critical investigation of an important aspect of Dramatic Art.

Plan II

Candidates must complete a minimum of 36 units in Dramatic Art and allied fields, of which at least 18 are in graduate courses, and take a written comprehensive examination not less than nine hours in length.

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.

Lower Division Courses

10A. Principles of Acting. (4) I, II.

Lecture—2 hours; laboratory—4 hours. The physical and psychological resources for acting; fundamentals of creative mime, improvisation, stage speech and movement. Reading and analysis of selective plays to illustrate principles involved. Field trips included.

Mr. Stambusky, Mr. Rossi

10B. Principles of Acting. (4) II, III.

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 10A. Methods of characterization in the realistic style. Reading and analysis of contemporary plays; theory and practice of acting with emphasis on realistic and naturalistic character analysis and interpretation. Field trips included. Mr. Stambusky, ———, Mr. Rossi

10C. Principles of Acting. (4) III.

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 10B or consent of instructor. Methods of characterization in non-realistic

styles. Reading and analysis of plays of different types and forms selected from various periods; theory and practice of acting with emphasis on period styles. Field trips included.

Mr. Rossi

15. The Art of the Cinema. (4) I, III.

Lecture—3 hours; laboratory—2 hours. The cinema as an art form; its relation to other arts; its evolution with emphasis on the significant modern contributions.

20. Introduction to Dramatic Art. (4) I, III.

Lecture—3 hours; discussion—1 hour. Understanding and appreciation of plays in their cultural contexts. The plays will be selected from the major periods of dramatic art.

Mr. McDermott, Mr. Stambusky

24. Visual Aspects of Dramatic Art. (4) III.

Lecture—3 hours; laboratory—2 hours. Understanding and appreciation of the visual aspects of dramatic art: theatre architecture, scenery, lighting, costume, and makeup.

Mr. Snyder

27. Creative Principles of Dramatic Art. (4) II.

Lecture—4 hours. Understanding and appreciation of both the distinctive and collaborative contributions of playwright, actor, director, and designer to the total work of dramatic art.

30. Theatre Laboratory. (1-5) I, II, III.

Prerequisite: consent of instructor. Projects in acting, production, scene design, costuming, lighting, directing, and playwriting. Participation in departmental productions. May be repeated for credit up to a total of 8 units.

The Staff

Upper Division Courses

110. Advanced Acting. (4) I.

Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 10A, 10B and 10C, and consent of instructor. Advanced theory and practice of acting with emphasis on special problems. Detailed study of the Stanislavski system of acting and other acting theories. Field trips included.

Mr. Rossi

115. Advanced Study of Major Film Makers. (4) II.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 15. Analysis of the contribution of some outstanding film creators. Study of diverse aesthetic theories of the cinema and their application to selected films.

124A. Principles of Theatrical Design. (3) I.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 24; or consent of instructor. Scene design: drafting methods, working draw-

ings, rendering techniques, scale models, methods and materials of scenery construction.

Mr. Chesley

124B. Principles of Theatrical Design. (4) II.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 124A. Analysis of plays in terms of scene design, elements of design, execution of designs for modern and period plays.

Mr. Snyder

124C. Principles of Theatrical Design. (3) III.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 24; or consent of instructor. Theories of lighting the stage, equipment and control systems, execution of lighting plots.

Mr. Chesley

124D. Principles of Theatrical Design. (3) III.

Lecture—2 hours; laboratory—2 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.

125. History of Scene Design and Staging Methods. (4) II.

Lecture—4 hours. Study of scenic developments from the Renaissance to the present.

Mr. Sarlos

127A. Principles of Directing. (4) I.

Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 10A and 10B. The director's creative approach to the play and to its staging.

Mr. Rossi

127B. Principles of Directing. (2) II.

Lecture—1 hour; laboratory—2 hours. Prerequisite: course 127A. The director's creative approach to the actor.

Mr. Stambusky

*150. American Drama. (4) III.

Lecture—4 hours. Selected plays and the history of the theatre from ancient Greece to Neoclassicism.

Mr. Sarlos

158A. World Drama. (4) I.

Lecture—4 hours. Selected plays and the history of the theatre from ancient Greece to Neoclassicism.

Mr. Sarlos

158B. World Drama. (4) II.

Lecture—4 hours. Selected plays and the history of the theatre from Neoclassicism to Naturalism.

Mr. Sarlos

159. Contemporary Drama. (4) III.

Lecture—4 hours. Selected plays and the history of the theatre from Naturalism to the present.

Mr. McDermott

* Not to be given, 1968-69.

160A-160B. Principles of Playwriting. (4-2) I-II.

Lecture—Seminar—4-2 hours. Prerequisite: two courses in Dramatic Art or related courses in other departments. Analysis of dramatic structure; preparation of scenarios; the composition of plays.

Mr. Shank

165. Dramatic Theory and Criticism. (4) III.

Lecture—Seminar—4 hours. Changing concepts of drama from Aristotle to the present.

Mr. McDermott

180. Theatre Laboratory. (1-5) I, II, III.

Prerequisite: upper division standing and 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.

The Staff

198. Directed Group Study. (1-4) I, II, III.

Lecture—1-4 hours. Prerequisite: consent of instructor.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor. The Staff

Graduate Courses**210. Special Problems in Advanced Acting. (4) II.**

Seminar—2 hours; laboratory—4 hours. Study of specialized advanced-acting problems arising from differences in the type and style of dramatic production as they relate to the history, theory, and practice of acting through the ages.

Mr. Rossi

224A. Advanced Principles and Theories of**Theatrical Design. (4) I.**

Seminar—3 hours. Selected problems in the visual and auditory aspects of theatrical production.

224B. Advanced Principles and Theories of**Theatrical Design. (4) II.**

Seminar—3 hours. Selected problems in the design of stage scenery and costumes; practice in design.

Mr. Chesley

227. Advanced Directing. (4) III.

Seminar—2 hours; laboratory—2 hours. Advanced directing techniques; specialized procedures in styles of drama. Projects in directing scenes from dramas of different types and periods.

Mr. Stambusky

228. Seminar in Directing. (4) II, III.

Seminar—3 hours. Prerequisite: course 227; or consent of instructor. Development of directorial conceptions for hypothetical contemporary productions of classical and modern plays.

Mr. Rossi

***230. Greek and Roman Theatre. (4) I.**

Seminar—3 hours. The classical theatre, with emphasis on the relationship of the dramas of

the period to the physical circumstances under which they were produced.

Mr. Sarlos

232. Medieval Theatre. (4) I.

Seminar—3 hours. The theatre and drama of the Middle Ages; the significant liturgical and secular influences upon the evolution of dramatic art from the fall of the Roman Empire to the Renaissance. Offered in even-numbered years.

Mr. Stambusky

***234. Theatre of the Italian Renaissance. (4) II.**

Seminar—3 hours. The Italian theatre after the rediscovery of classical antiquity, with emphasis on courtly spectacles and the emergence of a theatrical tradition characterized by proscenium arch, unified perspective setting, and changeable scenery. Offered in odd-numbered years.

Mr. Sarlos

235. Elizabethan-Jacobean Theatre. (4) III.

Seminar—3 hours. The theatre under the Tudors and Stuarts, with emphasis on the dominant dramatic and theatrical traditions and the relationship between the plays and the physical circumstances under which they were performed.

Mr. Sarlos

***240. French Seventeenth-Century Theatre. (4) I.**

Seminar—3 hours. The theatre under Louis XIII and Louis XIV. The manifestation of the classical ideal. Special study of the dramatic productions of plays by Corneille, Racine, and Molière. Offered in even-numbered years.

Mr. d'Harnoncourt

242. English Restoration and Eighteenth Century*Theatre. (4) I.**

Seminar—3 hours. The history of the British theatre in its attempt to accommodate such changes as the rise of sentiment in the drama, the dominance of the middle-class in the audience, and the introduction of changeable scenery. Offered in odd-numbered years.

Mr. McDermott

***244. The European Theatre of the Eighteenth and Nineteenth Centuries. (4) III.**

Seminar—3 hours. The development of such dramatic genres as domestic tragedy and melodrama, and the corresponding rise of scenic illusion, with the culmination of these trends in romanticism and realism.

Mr. McDermott

***250. Realism in the Contemporary Theatre. (4) I.**

Seminar—3 hours. The realistic drama in its theatrical context.

Mr. Sarlos

259. Contemporary Nonrealistic Trends in the**Theatre. (4) II.**

Seminar—3 hours. Nonrealistic drama in the twentieth century and related movements in the theatre.

Mr. McDermott

* Not to be given, 1968-69.

260. Advanced Playwriting. (4) I, II, III.

Seminar—3 hours. Dramatic structure, character, and dialogue. Advanced projects in playwriting.
Mr. Shank

265. Theory of Dramatic Art. (4) I.

Seminar—3 hours. Theory and aesthetic principles of dramatic art as a fine art.
Mr. McDermott

280. Theatre Laboratory. (1-12) I, II, III.

Advanced practice in acting, design, directing, playwriting, and technical theatre.
The Staff

298. Group Study. (1-4) I, II, III.

Seminar—1-3 hours. Prerequisite: consent of instructor.
The Staff

299. Individual Study. (1-12) I, II, III.

The Staff

ECONOMICS

Frank C. Child, Ph.D., *Chairman of the Department*

Department Office, 378 Voorhies Hall

Professors:

*Frank C. Child, Ph.D.
Bruce Glassburner, Ph.D.
², ³Thomas Mayer, Ph.D.

Associate Professors:

Andrzej Brzeski, Ph.D.
Martin P. Oettinger, Ph.D.
Tsung-yuen Shen, Ph.D.
Elias H. Tuma, Ph.D.
Henry Y. Wan, Jr., Ph.D.
Leon L. Wegge, Ph.D.

Assistant Professors:

Kenneth D. Goldin, Ph.D.
W. Eric Gustafson, Ph.D.
¹Hiromitsu Kaneda, Ph.D.
Norman Schneider, Ph.D.

◇ ◇ ◇

Assistant Professor:

Victor P. Goldberg, M.A. (*Acting*)

Lecturers:

Thomas F. Cargill, M.A.
C. Daniel Vencill, M.A.

Departmental Major Advisers.—Mr. Brzeski, Mr. Kaneda, Mr. Shen, Mr. Schneider, Mr. Gustafson, Mr. Oettinger, Mr. Goldin.

Graduate Adviser.—Mr. Wan, Mr. Tuma, Mr. Wegge.

The American History and Institutions requirement may be satisfied in part by Economics 111. (See also page 34.)

Economics*The Major Program*

Lower Division Courses.—Required: Economics 1A, 1B, or the sequence, Economics 2A-2B-2C; Economics 12; and at least a C average in these courses. 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 requirement. Approval from a departmental adviser is required in all such cases. Students planning to major in economics should complete these courses by the end of the sophomore year normally.

Students considering graduate study in economics or business are strongly urged to take Mathematics 15, 16A, and 16B.

Upper Division Courses.—Required: A total of 36 units of economics including (1) Economics 100A, 100B, 101A, 101B; (2) either Economics 110A, 110B, or 111; and (3) one of the following sequences of courses: 110A, 110B, or 111; 116, 117; 121A, 121B; 130A-130B; 135A, 135B, 135C; 150A, 150B; 160, 161.

It is recommended that Economics 100A, 100B, 101A, and 101B be taken during the junior year; 101A and 101B may be taken before, concurrently with, or prior to 100A or 100B. Except under extraordinary circumstances, not more than three economics courses may be taken in any one quarter.

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 about admission to graduate study, degree requirements, and financial aid, students should consult the *Announcement of the Graduate Division* and contact the Department's Graduate Adviser.

Teaching Major and Minor.—Economics is acceptable for the secondary credential.

Teaching Major.—Same as for the undergraduate major for the A.B. degree.

Teaching Minor.—Thirty units in economics

¹ Absent on leave, 1968-69.

² Absent on leave, fall quarter 1968.

³ Absent on leave, winter quarter 1969.

including Economics 1A, 1B, and 12. The student should consult with the subject representative.

Subject Representative: Mr. Brzeski.

Lower Division Courses

1A. Principles of Economics. (5) I, III.

Lecture—3 hours; discussion—2 hours. Prerequisite: 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.

The Staff

1B. Principles of Economics. (5) II, III.

Lecture—3 hours; discussion—2 hours. Prerequisite: 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.

The Staff

2A-2B-2C. Principles of Economics. (4-3-3)

I-II-III.

Lecture—3-2-2 hours; discussion—1-1-1 hour. Same as Economics 1A and 1B. Students enrolling for a full year of Principles of Economics must complete either 1A-1B or 2A-2B-2C.

The Staff

11A. Elementary Accounting. (4) I.

Lecture—3 hours; laboratory—2 hours. The 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; social accounting.

The Staff

11B. Elementary Accounting. (3) II.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 11A. Continuation of course 11A.

The Staff

12. Introduction to Quantitative Methods in Economics. (5) I, III.

Lecture—4 hours; laboratory—2 hours. Prerequisite: two years of high school algebra. Not open to students having credit for Mathematics 13 or Psychology 3. Methods of analyzing quantitative economic data including descriptive statistics; sampling and statistical inference index numbers, correlation, and time series. Emphasis on the logic of procedures, interpretation, and application.

Mr. Brzeski, Mr. Gustafson

49. Lower Division Seminar. (1-3) I, II, III.

Seminar—1-3 hours. Prerequisite: lower division standing; consent of instructor.

The Staff

Upper Division Courses

100A. Micro Theory: Welfare and Competition. (3) I, II, III.

Lecture—3 hours. Prerequisite: courses 1A and 1B; or consent of instructor. Price and distribution theory; the firm and the industry under conditions of perfect competition; welfare economics.

Mr. Cargill, Mr. Schneider

100B. Micro Theory: Imperfect Competition. (3) II, III.

Lecture—3 hours. Prerequisite: course 100A. Price and distribution theory; the firm and the industry under conditions of monopoly, imperfect competition, and bilateral monopoly; economic welfare considerations.

Mr. Cargill

101A. Macro Theory: Statics. (3) I, III.

Lecture—3 hours. Prerequisite: courses 1A and 1B; or consent of instructor. Theory of income, employment, and prices under static conditions.

Mr. Goldberg

101B. Macro Theory: Dynamics. (4) II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 12 and 101A. Theory of income, employment, and prices under dynamic conditions; analysis of economic fluctuations and growth.

Mr. Goldberg, Mr. Schneider

102. Advanced Economic Theory. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100A and one course in calculus. Mathematical analysis in economic theory; determinants of the aggregate level of output and employment and the allocation of resources. Includes advanced value and distribution theory and a brief examination of modern monetary theory.

103. Theory of Economic Optimization and Dynamic Processes. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 100B, 101A; Mathematics 16A, 16B (may be taken concurrently). Study of the analytical concepts used in characterizing optimal decision for consumers and firms. Elements of activity analysis. Theory of dynamic systems used in business cycle theory, inflation and economic growth.

Mr. Wegge

105. History of Economic Thought. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 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.

Mr. Cargill

110A. Economic History. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B or consent of in-

structor. Survey of economic change in Europe prior to the year 1700; reference to other regions of the Eastern Hemisphere; implications for contemporary economic development.

Mr. Tuma

110B. Economic History. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 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.

Mr. Tuma

111. Economic History. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B or consent of the instructor. Survey of economic change in the United States beginning with the Colonial Period; reference to other regions of the Western Hemisphere; implications for contemporary economic problems.

115A-115B. Economic Development. (4-4) I-II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B. Theories of economic development and underdevelopment, economic policy for growth and development. Contemporary and historical case studies.

Mr. Glassburner, Mr. Shen

116. Economic Systems. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 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.

Mr. Brzeski

117. The Soviet Economy. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of instructor. Survey of Soviet economic development: economic organization, methods of planning, and performance.

Mr. Brzeski

121A. Industrial Organization. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; 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.

Mr. Goldberg

121B. Industrial Organization. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 121A. Public policy in a private enterprise economy; antitrust and other policies toward industry; economies of regulated industries.

Mr. Goldberg

125. Urban Economics. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A, 1B. The structure of the metropolitan economy. The process of urban economic growth. Major problems such as: urban poverty and decay, housing, transportation, land-use planning and financing public services.

Mr. Schneider

130A-130B. Economics of the Public Sector. (4-4)

I-II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of instructor. Impact of the public sector on income, employment, prices, allocation of resources, and distribution of income; related topics such as the budgetary process, public debt, revenue and expenditure problems, fiscal institutions.

***134. Corporation Finance. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A and 1B; or consent of instructor. The corporation as a form of business organization; promotion, organization, operation, expansion, consolidation, failure, and reorganization; the capital market, financial instruments, and institutions; security markets.

135A. Money, Income, and Monetary Policy. (3) I.

Lecture—3 hours. Prerequisite: courses 1A and 1B; or consent of instructor. Monetary institutions, the banking system, money creation, the Federal Reserve System, the tools of monetary policy.

Mr. Mayer

135B. Money, Income, and Monetary Policy. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 101A and 135A. Monetary theory; the impact of changes in the quantity of money and of liquid assets on money income.

135C. Money, Income, and Monetary Policy. (3) III.

Lecture—3 hours. Prerequisite: course 135B. Evaluation of monetary policy, its impact on the economy and past performance, the problem of inflation.

150A. Labor Economics. (5) II.

Lecture—4 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of instructor. Historical analysis of worker organization and of trade union philosophy and practice; theoretical exploration of basic influences affecting real wages and employment; examination of relevant statistical records; wage structure and wage level problems; union-management relations and the national economy.

Mr. Oettinger

* Not to be given, 1968-69.

150B. Labor Economics. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of instructor. Labor law and legislation and their economic impact; collective bargaining and economic conflict; economic impact of laws regulating minimum wages, hour of work, and other labor standards; government intervention in collective bargaining and dispute settlement.

Mr. Oettinger

160. International Trade. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of instructor. International trade theory; impact of trade on the domestic and the world economies; public policy toward external trade.

161. International Finance. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1A and 1B; or consent of instructor. International money and capital markets and their impact on the domestic and world economies; international financial institutions and policies.

***190. Senior Seminar. (5) III.**

Seminar—4 hours. Prerequisite: open only to economics majors with senior standing; consent of instructor. Selected topics in economic analysis and public policy.

The Staff

198. Directed Group Study. (1–5) I, II, III.

Prerequisite: permission of instructor; upper division standing.

The Staff

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

The Staff

Graduate Courses**200A. Economic Theory. (3) I.**

Lecture—3 hours. Price and value theory; behavior of firms and households under competitive conditions; price determination, resource allocation, and income distribution; fundamentals of welfare economics.

Mr. Wegge

200B. Economic Theory. (3) II.

Lecture—3 hours. Prerequisite: course 200A. A continuation of course 200A with reference to noncompetitive conditions.

Mr. Wan

200C. Economic Theory. (3) II.

Lecture—3 hours. Macrostatic theory of income, employment, and prices.

Mr. Wegge

200D. Economic Theory. (3) I.

Lecture—3 hours. Prerequisite: course 200C. Macrodynamic theory of income, employment, and prices.

Mr. Wan

201. History of Economic Thought. (4) III.

Lecture—3 hours; discussion—1 hour. Development of economic thought from classical Greece to modern times.

Mr. Shen

203A. Advanced Economic Theory. (4) II.

Seminar—4 hours. Prerequisite: course 200B. Advanced topics in the theory of the firm; distribution theory; welfare economics.

Mr. Wan

203B. Advanced Economic Theory. (4) III.

Seminar—4 hours. Prerequisite: courses 200B and 200C. General equilibrium theory; capital theory; growth theory.

Mr. Wan

207. Special Topics in Mathematical Economics.*(4) II.**

Seminar—3 hours. Prerequisite: courses 203A and 203B or consent of instructor. Advanced topics in mathematical economics. Contents may vary from one year to another.

Mr. Wan

210A. Economic History. (4) I.

Seminar—3 hours. Method and theory of economic history. Critical analysis of the methodology of economic history and theories of economic change as illustrated by major economic phenomena drawn from the history of different countries.

Mr. Tuma

210B. Economic History. (3) II.

Lecture-discussion—3 hours. Prerequisite: course 210A. Problems in economic history of the eastern hemisphere from the beginning of the Middle Ages up to the end of the eighteenth century; emphasis on Europe.

Mr. Tuma

210C. Economic History. (3) III.

Lecture-discussion—3 hours. Prerequisite: course 210A. Problems in economic history of the eastern hemisphere since the eighteenth century; emphasis on England, France, and Germany.

Mr. Tuma

210D. Economic History. (3) III.

Lecture-discussion—3 hours. Prerequisite: course 210A. Problems in economic history of the western hemisphere since the eighteenth century; emphasis on United States.

Mr. Tuma

215A–215B. Economic Development. (4–4) I–II.

Lecture—3 hours; discussion—1 hour. Theories of economic development, policies for growth, problems from selected areas.

Mr. Glassburner, Mr. Shen

216. Economic Systems. (4) II.

Lecture—4 hours. Comparative study of economic systems, with reference to their organization and institutions, their values and goals, and their economic performance.

Mr. Brzeski

217. Economics of Planning. (4) III.

Lecture—4 hours. Theories and principles of economic planning under various economic systems.

Mr. Brzeski

* Not to be given, 1968–69.

***218. Development Programming. (4) III.**

Seminar—3 hours. Prerequisite: courses 215B and 217; Mathematics 15 and 16B. Analytical formulation of growth and development goals including the optimal growth models; problems and practices in implementing such development policies. Mr. Shen

221A. Industrial Organization. (4) I.

Lecture—2 hours; seminar—2 hours. Analysis of market structure, business behavior, and economic performance under conditions of limited government interference. Mr. Schneider

221B. Industrial Organization. (4) II.

Lecture—2 hours; seminar—2 hours. Prerequisite: course 221A. Social standards and public policies toward the business sector of the economy. Mr. Schneider

230. Public Finance. (4) II.

Lecture—2 hours; seminar—2 hours. Role of the public sector; tax and expenditure theories; related topics. Mr. Goldin

231. Problems of the Public Sector. (4) III.

Lecture—2 hours; seminar—2 hours. Prerequisite: course 230. Public sector institutions, problems, and policies. Mr. Goldin

235A-235B-235C. Monetary Economics. (3-3-3)

I-II-III.

Lecture—3 hours. Monetary theory, policy, and problems. Mr. Mayer, ———, Mr. Vencill

240A. Econometrics: Principles. (4) III.

Lecture-discussion—4 hours. Prerequisites: Mathematics 15 and 131B. General linear

model, auto-correlation, multicollinearity, heteroscedasticity. Simultaneous equation problems.

Mr. Wegge

240B. Econometrics: Advanced Topics. (3) I.

Lecture-discussion—3 hours. Prerequisite: course 240A. Special problems in the theory and the applications of econometrics. Mr. Wegge

250A. Labor Economics. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 150A and 150B. Philosophy and theory of the labor movement; union structure and organization under changing labor market conditions; labor market issues.

Mr. Oettinger

250B. Labor Economics. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 150A and 150B. Theory of the labor market; analysis of wage-employment, wage-investment, and wage-price relationships.

Mr. Oettinger

260A. International Economics. (4) II.

Lecture—3 hours; discussion—1 hour. Economic structure and factors that underlie international trade; policies for regulating external trade.

Mr. Wan

260B. International Economics. (4) III.

Lecture—3 hours; discussion—1 hour. Significance of international transactions for the national income; international monetary mechanisms.

299. Individual Study. (1-6) I, II, III.

The Staff

EDUCATION

Julius M. Sassenrath, Ph.D., *Chairman of the Department*

Department Office, 228 Voorhies Hall

Professor:

Hugh C. Black, Ph.D.

Associate Professor:

Julius M. Sassenrath, Ph.D.

Assistant Professors:

V. Kenneth Shrable, Ph.D.

Leroy F. Troutner, Ph.D.

George D. Yonge, Ph.D.

Professor:

Kingsley B. Price, Ph.D. (*Visiting*)

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Lecturers in and Supervisors of Teacher Education:

Dorothy S. Blackmore, Ed.D. (*Associate Head of Teacher Education*)

Larry D. Estes, M.A.

Maryann E. Gatheral, B.A.

Robert E. Hapworth, M.A.

Ross Hempstead, M.A.

Burt Liebert, M.F.A.

Walter T. Mara, M.S.

Douglas L. Minnis, Ed.D. (*Head of Teacher Education*)

Victor A. Perkes, Ed.D.

Shirley J. Skinner, M.A.

Credentials Counselors:

Elementary.—Mrs. Blackmore, Mrs. Gath-

* Not to be given, 1968-69.

† Absent on leave, 1968-69.

eral, Mr. Hapworth, Mr. Hempstead, Mrs. Skinner.

Secondary.—Mr. Estes, Mr. Mara, Mr. Liebert, Mr. Perkes.

Junior College.—Mr. Mara.

Curricula for Teacher Education.—(See page 137). For a statement of complete requirements and appointments with credential counselors, apply to the departmental office. Applicants for the intern program should consult the department early in the fall quarter of the senior year.

Required courses in the "Professional Preparation" part of the requirements:

For Secondary Teaching: courses 320A (for student teachers, as early as junior year; for interns, spring quarter of senior year), 110, 120, 320C, and 320E.

For Elementary Teaching: courses 330A, 110, 120, 300, 302, 303, 330C, and 330E.

Upper Division Courses

110. Introduction to Educational Psychology. (4) I, II, III.

Lecture—4 hours. Prerequisite: Psychology 1A. The learning process; physical, mental, and social development; individual differences and their measurement; mental hygiene; the role of the teacher in guidance and counseling.

Mr. Sassenrath, Mr. Shrable, Mr. Yonge

114. Quantitative Methods in Educational Research. (4) I.

Lecture—2 hours; discussion—2 hours. Prerequisite: two years of high school algebra. Problems and methods in data analysis. Design of research projects. Emphasis will be on procedures suited to digital computers. The Staff

119. Tests and Measurements. (4) II.

Lecture—4 hours. Prerequisite: course 110 (may be taken concurrently). A critical survey of teacher-made and standardized tests; principles and functions of measurement in education, current practices in school marks; supervised work in test administration, scoring, and interpretation.

Mr. Yonge

120. Educational Sociology. (4) I, II, III.

Lecture—4 hours. The school as a social institution; historical development of purposes and programs of education; the role of the teacher.

Messrs. Black, Price, Troutner

163. Guidance and Counseling. (4) III.

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. Mr. Shrable

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

Graduate Courses

201. History and Philosophy of Education—Ancient Period. (4) I.

Lecture—2 hours; seminar—2 hours. The scope, influence, and significance of the major educational ideas from selected ancient societies and cultures with emphasis upon the historical and philosophical contexts. Mr. Price

202. History and Philosophy of Education—Middle Period. (4) II.

Lecture—2 hours; seminar—2 hours. The scope, influence, and significance of the major educational ideas from selected societies and cultures of the middle period (through the 18th century) with emphasis upon the historical and philosophical contexts. Mr. Price

203. History and Philosophy of Education—Modern Period. (4) III.

Lecture—2 hours; discussion—2 hours. A critical analysis and study of the contemporary educational scene from the historical and philosophical perspectives. Mr. Troutner

210. Learning and Instruction. (3) I.

Seminar—3 hours. Prerequisite: course 110 or equivalent and consent of instructor. Critical readings and seminar reports of selected problems and procedures in the experimental study of learning and instruction. Mr. Sassenrath

211. Thinking and Problem Solving. (3) II.

Seminar—3 hours. Prerequisite: course 110 or equivalent and consent of instructor. Critical consideration of thinking with special reference to concept development, problem-solving, home, school, and personality influences. Mr. Yonge

219. Advanced Educational Measurement. (3) III.

Seminar—3 hours. Prerequisite: course 119 or equivalent and consent of instructor. Critical study and evaluation of an advanced level of measurement procedures used in educational research, including such topics as test theory, item analysis, and factor analysis. Mr. Sassenrath

290. Seminar. (3) I, II, III.

Seminar—3 hours.

The Staff

299. Research. (1-6) I, II, III.

The Staff

Professional Courses

300. Language Arts in the Elementary School. (3) I, II, III.

Lecture—3 hours. Prerequisite: consent of instructor. Principles, procedures, and curricular materials for the teaching of reading, and oral and written language skills.

Mrs. Blackmore, Mrs. Skinner

302. Elementary School Curriculum—Social Studies. (2) II.

Lecture—2 hours. Current conceptions of the elementary school curriculum, with emphasis on the contributions from the social sciences and on effective teaching methods. Mr. Minnis

303. Elementary School Curriculum—Science. (2) III.

Lecture—2 hours. Current conceptions of the elementary school curriculum with emphasis on the role of science and on effective teaching methods. Mr. Hapworth

***320A. Introduction to Teaching in Secondary Schools.** (2) I, II, III.

Lecture—1 hour; discussion—1 hour. Lectures, conferences, and field work in secondary teaching. Observations and participation in some form of public school work.

Mr. Estes, Mr. Mara, Mr. Minnis

***†320C. Supervised Teaching in Secondary Schools.** (4-12) I, II, III.

Prerequisite: course 320A; course 320E must be taken concurrently. Directed teaching for candidates for the secondary credential. May be repeated for credit up to a total of 12 units.

The Staff

††320E. Methods of Teaching in Secondary Schools. (2) I, II, III.

Lecture—2 hours. Prerequisite: course 320A; course 320C must be taken concurrently. Methods of teaching in the secondary school; selection, organization, and evaluation of teaching materials including the use of audio-visual aids and the services of counseling and guidance

programs. May be repeated for credit up to a total of 4 units.

The Staff

***330A. Introduction to Teaching in Elementary Schools.** (2) I, II, III.

Lecture—1 hour; discussion—1 hour. Lectures, conferences, and field work; observation of and participation in classroom activities in the public elementary schools. Mrs. Blackmore

***†330C. Supervised Teaching in Elementary Schools.** (4-12) I, II, III.

Prerequisite: course 330E must be taken concurrently. Directed teaching for candidates for the elementary credential.

The Staff

††330E. Methods of Teaching in Elementary Schools. (1-2) I, II, III.

Lecture—1-2 hours. Prerequisite: course 330C must be taken concurrently. Selection, organization, and evaluation of teaching materials including audio-visual aids. May be repeated for credit up to a total of 3 units.

The Staff

***††340. Supervised Teaching in Junior Colleges.** (5) I, II, III.

Discussion—1 hour. Prerequisite: consent of instructor. Directed teaching for candidates for the standard teaching credential with specialization in junior college teaching.

The Staff

341. Teaching in the Junior College. (3) II.

Lecture—3 hours. Prerequisite: consent of instructor. The junior college: organization and functions, role in higher education, characteristics of students, trends and issues in curricula, instructional procedures and materials.

Mr. Mara

ENGINEERING

Roy Bainer, M.S., *Dean of the College*
College Office, 2132 Engineering I

Lower Division Courses

1. Plane Surveying. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: plane trigonometry. Not open to students in Engineering. Principles of measurement of horizontal distances, horizontal angles, elevations and leveling, including stadia methods. Field problems, including mapping with special reference to agricultural and landscaping applications.

Mr. Goss

3. Introduction to Engineering Systems. (3) I, II, III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 21A (may be taken concurrently). An introductory study of selected engineering systems, processes, and parameters

involving fluid flow, energy conversion, micro-distance measurements, and other physical quantities. A brief introduction to the operation and programming of the electronic analog computer. Field trips may be scheduled.

The Staff (Mr. Brush in charge)

†† Open only to interns and student teachers. These 300 series courses are scheduled as extra-session courses, to begin with the opening of the public schools and to end with the closing of the second semester in the public schools. Thus teaching assignments in the fall quarter, 1968, will begin on or about September 3. For the spring quarter, they will end on or about June 6. Students should make arrangements accordingly.

* Students must make their own transportation arrangements for observations and student teaching.

4. Engineering Graphics in Design. (3) I, II, III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: mechanical drawing. Principles of descriptive geometry and of mechanical and free-hand drawing; their application in the representation, visualization and solution of engineering problems. Introduction to engineering design.

Mr. J. M. Henderson

5A. Engineering Applications of Computers. (3) II, III.

Lecture—2 hours; discussion—1 hour. Prerequisite: Mathematics 21A; Physics 4A (may be taken concurrently). Introduction to digital computer structure, computer languages, and time-sharing systems; programming digital computers with applications to engineering problems of both numerical and non-numerical natures.

Mr. Loomis

17. Circuits. (3) I, II, III.

Lecture—3 hours. Prerequisite: Mathematics 22B (may be taken concurrently); Physics 4C. Basic circuit analysis techniques; transient and steady-state solutions using differential equations.

Mr. LaPatra, Mr. Owen

35. Statics. (3) I, II, III.

Lecture—3 hours. Prerequisite: Mathematics 21C; Physics 4A. Force systems and equilibrium conditions with emphasis on engineering problems.

The Staff

45. Properties of Materials. (4) I, III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: sophomore standing in engineering. An introductory course on the properties of engineering materials and their relation to the internal structure of the materials.

Mr. Mukherjee, Mr. Moon

Upper Division Courses**100. Electronics. (2) I, II, III.**

Lecture—2 hours. Prerequisite: course 17 (may be taken concurrently). Characteristics of vacuum and semiconductor devices; graphical analysis and the development of small signal equivalent circuits.

Mr. LaPatra, Mr. Hsia

101. Electrical Laboratory. (2) I, II, III.

Laboratory—6 hours. Prerequisite: course 17 (may be taken concurrently). Laboratory use of basic electronic devices and measuring instruments. Problem topics include passive and active circuits, electromechanical devices, signal analysis, and nonlinear components.

Mr. LaPatra, Mr. Loomis

102A. Dynamics. (3) I, II, III.

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.

Mr. J. M. Henderson

102B. Dynamics. (3) II, III.

Lecture—3 hours. Prerequisite: course 102A. Topics in rigid body dynamics; elementary dynamics of vibrating systems; introduction to energy methods.

Mr. J. M. Henderson

103A. Elementary Fluid Mechanics. (3) I, II.

Lecture—3 hours. Prerequisite: course 102A. Fluid properties; fluid statics; continuity and linear momentum equations for control volumes; flow of incompressible fluids in pipes; dimensional analysis; laminar, transition, and turbulent flow regimes.

Mr. Dwyer

103B. Elementary Fluid Mechanics. (3) II, III.

Lecture—3 hours. Prerequisite: course 103A. Potential flow; open channel flow; boundary layer flow; one dimensional compressible flow.

Mr. Dwyer

104A. Mechanics of Materials. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 35; Mathematics 22A, 22B, 22C (may be taken concurrently). Concepts of stress, strain, elasticity; stress and deformation analysis for axially loaded members, torsion of round shafts, bending and shear of beams; combined stresses.

The Staff

104B. Mechanics of Materials. (3) II, III.

Lecture—3 hours. Prerequisite: course 104A. Beams: unsymmetrical loading, shear center, indeterminate problems, inelastic bending, buckling and lateral instability. Energy methods; failure theories; torsion of thin-walled sections.

The Staff

105A. Thermodynamics. (3) I, II.

Lecture—3 hours. Prerequisite: Mathematics 22B, 22C. Equations of state and thermodynamics of one-component systems; first and second laws; phase equilibria.

Mr. Giedt

105B. Thermodynamics. (3) II.

Lecture—3 hours. Prerequisite: course 105A. Gas mixtures; work-producing and work-absorbing cycles (vapor and gas); measures of performance. Recent developments.

Mr. Giedt

106. Engineering Economics. (3) I, II.

Lecture—3 hours. Prerequisite: senior 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.

Mr. Hart

122. Introduction to Mechanical Vibrations. (3) I.

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.

Mr. Kemper

180. Engineering Analysis. (3) I.

Lecture—3 hours. Prerequisite: senior standing in engineering. The 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.

Mr. McKillop

183. Intermediate Mechanics of Materials. (3) II.

Lecture—3 hours. Prerequisite: course 104B; Mathematics 24. Stresses and deformations of curved beams; beams on elastic foundations; torsion of non-circular bars; introduction to plates and shells; thick-walled cylinders.

Mr. Hutchinson

184. Experimental Stress Analysis. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 104B. Experimental methods for the analysis of stress and strain, including photoelasticity, brittle lacquers, mechanical and electrical strain gages and instrumentation.

Mr. Beadle

186. Heat Transfer. (4) I, III.

Lecture—3 hours; discussion—1 hour. Fundamental concepts of heat transfer; conduction, radiation, convection.

Mr. Whitaker

187. Introduction to Theory of Elasticity. (3) I, III.

Lecture—3 hours. Prerequisite: course 183 or consent of instructor. Fundamental equations of elasticity in three dimensions; plane stress and plane strain; flexure and torsion of bars of various shapes.

Mr. Hutchinson

188. Physical Metallurgy Principles. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 45, 105A; Physics 4B. The physical principles in metallurgy are outlined. The elementary theory of metals, rate of approach to equilibrium, thermal behavior of metals, structure and free energy of alloy phases, diffusion phenomenon and strengthening mechanisms in solids are discussed. Mr. Mukherjee

190. Professional Responsibilities of Engineers.

(3) II, III.

Lecture—2 hours; discussion—1 hour. Prerequisite: senior standing in engineering. Interaction between the engineer and society; organization of the engineering profession; engineering and management; technical innovation and product development; introduction to contracts and business law; engineering specifications; written and oral presentation of brief reports.

Mr. Kemper

ENGINEERING: AGRICULTURAL—See also Agricultural Engineering**ENGINEERING: AGRICULTURAL**

Coby Lorenzen, M.S., *Chairman of the Department*

Department Office, 2030 Engineering I

Professors:

John R. Goss, M.S.
Samuel A. Hart, Ph.D.
S. Milton Henderson, M.S.
Robert A. Kepner, B.S.
Coby Lorenzen, M.S.
Loren W. Neubauer, Ph.D.
Wesley E. Yates, M.S.

Associate Professors:

¹William J. Chancellor, Ph.D.
Robert B. Fridley, M.S.

Assistant Professor:

Stanton R. Morrison, Ph.D.

◇ ◇ ◇

Lecturers:

¹Roger E. Garrett, M.S.
²Joe P. Gentry, M.S.
Herbert B. Schultz, Ph.D.
Henry E. Studer, M.S.

Upper Division Courses**114. Principles of Farm Machinery. (4) I.**

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 102B. Functional requirements, basic principles, and performance characteristics of field machines; cost analysis; general design considerations; laboratory studies and tests with specific machines. Mr. Yates

116. Agricultural Power. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 105B. Sources and systems for supplying energy to agricultural operations: internal combustion engines; fuels; electric power; solar energy; power transmission systems; muscle physiology; traction and vehicle mechanics; implement control systems.

Mr. Lorenzen

117. Developing and Evaluating Farm Machines.

(3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 114; Mechanical Engineering

¹ Absent on leave, 1968–69.

² Absent on leave, fall quarter 1968.



118. Design procedures; effects of biological factors, labor requirements, crop values, and annual use upon the design approach; designing a production unit; hydraulic controls and power transmission in farm machines; testing and evaluating machine performance and durability.

Mr. Kepner

118. Development Engineering. (2) III.

Lecture—2 hours. Prerequisite: Mechanical Engineering 118 (may be taken concurrently). Failure modes; determination of the causes of systems malfunction by analysis of interactions and variations in effects; experiment design; development procedures.

Mr. Studer

125. Agricultural Structures and Sanitation. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 35 and 104A. Functional and material requirements of storage and production structures; lighting, heating, insulating, and ventilating; water supply and sanitation for the farm home and for animal structures; methods and economics of farm waste disposal.

Mr. Neubauer

126. Design of Agricultural Structures. (3) III.

Lecture—3 hours. Prerequisite: course 125; Civil Engineering 131A. Agricultural building loads and codes; design with steel, concrete, and timber; glued-laminated and plywood box beams; pole buildings and connections; lumber rigid frames; arches.

132. Unit Operations in Agricultural Processing. (4) III.

(4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Engineering 103B and 105B. Thermodynamic and mass transfer principles applied to such processes as drying, dehydration, refrigeration, size reduction, separation, and materials handling.

Mr. Henderson

141. Engineering Properties of Agricultural Materials. (3) I.

Lecture—2 hours; laboratory—3 hours. Selected topics, with emphasis on mechanical and rheological properties and design applications. Techniques for measuring and recording static and dynamic properties.

Mr. Fridley

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of the instructor.

The Staff

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

The Staff

Graduate Courses

***215. Soil-Machine Relations in Tillage and Traction. (2) II.**

Lecture—2 hours. Prerequisite: courses 114

and 116 (may be taken concurrently); Civil Engineering 171. Recommended: Soil and Water Science 101. Mechanics of interactions between agricultural soils and tillage and traction devices; determination of relevant physical properties of soil; analyses of stresses and strains in soil due to machine-applied loads; experimental and analytical methods for synthesizing characteristics of overall systems.

Mr. Chancellor

225. Advanced Agricultural Structures Design. (3) II.

Lecture—3 hours. Prerequisite: course 126. Recommended: Civil Engineering 132B and 132C. Critical evaluation of codes as applied to agricultural structures; safe design criteria, load sharing, and statistical reliability concepts; computer analysis of indeterminate wood structures; stressed skin construction; ultimate strength design in reinforced concrete; applications of new materials and methods.

235. Advanced Unit Operations in Agricultural Processing. (2) II.

Lecture—2 hours. Prerequisite: course 132 or equivalent. Basic engineering procedures applicable to agricultural processing; e.g., size reduction, fluidization of granular particles, heat and mass transfer applications to drying and freezing, respiration of bio-materials.

Mr. Henderson

245. Agricultural Waste Management. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 125; Civil Engineering 148. The wastes problem peculiar to agriculture; types of rural and agricultural wastes, quantities and characteristics; practices and procedures for wastes management; coordination of agricultural wastes handling activities with that of all the community.

Mr. Hart

255. Environmental Engineering in Agriculture. (3) II.

Lecture—3 hours. Prerequisite: Engineering 186. The description, methods of measurement and effect on man, animals and plants of physical environmental factors, and the design of systems for their control.

Mr. Morrison

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff

298. Group Study. (1-5) I, II, III.

The Staff (Mr. Henderson in charge)

299. Research. (1-12) I, II, III.

The Staff

* Not to be given, 1968-69.

ENGINEERING: APPLIED SCIENCE

Albert J. Kirschbaum, Ph.D., *Chairman of the Department*
 Wilson K. Talley, Ph.D., *Vice-Chairman of the Department*

Department Office, 228 Walker

Professors:

Stewart D. Bloom, Ph.D.
 Edward Teller, Ph.D. (*Professor at Large*)

Associate Professors:

Richard J. Borg, Ph.D.
 Albert J. Kirschbaum, Ph.D.

Assistant Professors:

Carl A. Jensen, Ph.D.
 George D. Sauter, Ph.D.
 Wilson K. Talley, Ph.D.
 Lowell L. Wood, Ph.D.

◇ ◇ ◇

Professor:

Richard F. Post, Ph.D. (*In Residence*)

Lecturers:

Gary B. Anderson, M.S.
 Stephen E. Bodner, Ph.D.
 Frank M. Chilton, Ph.D.
 Sidney S. Fernbach, Ph.D.
 Joseph Fleck, Ph.D.
 John G. Fletcher, Ph.D.
 Michael W. Guinan, B.A.
 William G. Hoover, Ph.D.
 Tony Huen, Ph.D.
 Montgomery H. Johnson, Ph.D.
 Roger N. Keeler, Ph.D.
 Ray E. Kidder, Ph.D.
 John Killeen, Ph.D.
 Cecil E. Leith, Ph.D.
 Kenneth Moses, Ph.D.
 David N. Pipkorn, Ph.D.
 Jacques B. Read, Ph.D.
 Harry L. Sahlin, Ph.D.
 John J. Walton, Ph.D.
 Frederick O. Wooten, Ph.D.

Davis

Upper Division Courses

115. Introduction to the Use of Computers. (3) I, II, III.

Lecture—3 hours. Prerequisite: Engineering 5A; Mathematics 22B. Lectures and laboratory work on electronic computers and their application to engineering problems.

Mr. Talley, Mr. Jensen

135A. Introductory Nuclear Science and Technology. (3) II.

Lecture—3 hours. Prerequisite: Physics 121 or equivalent. Interaction of gamma rays, elec-

trons, and heavy particles with matter; energy loss and multiple scattering formulae and their application in various media. Introductory aspects of nuclear phenomena: nuclear masses, size, energies, and decay modes. Mr. Sauter

144. Introduction to Nuclear Technology. (3) III.

Lecture—3 hours. Prerequisite: course 135A. Nuclear reactions and their applications: nuclear energy sources, radiation detection; nuclear instrumentation. Nuclear particle accelerators. High vacuum technology. Mr. Sauter

Graduate Courses

230A–230B–230C. Structure of Matter.

(3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: course 110C. 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. Mr. Jensen

240A–240B–240C. Nuclear Reactor Analysis.

(3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: course 110C. The physical concepts and mathematical techniques used in the analysis of nuclear reactors. Mr. Sauter

244. Nuclear Reactor Applications. (3) III.

Lecture—3 hours. Prerequisite: course 135A; Mathematics 220C. Application of nuclear reactors: power; research; isotope production; terrestrial; marine; space. Direct energy conversion. Use of radioisotopes. Mr. Sauter

245A–245B. Nuclear Reactor Systems. (3–3) I–II.

Lecture—3 hours. Prerequisite: course 240A. Those aspects of fluid dynamics, thermodynamics, heat transfer, and thermal stress analysis that apply to the engineering design of nuclear reactors. Radiation shielding, fuel cycles, and isotope separation. Mr. Sauter

246. Nuclear Explosives: Phenomenology. (3) II.

Lecture—3 hours. Prerequisite: Mathematics 220A. The phenomenology of nuclear explosives; the theoretical and empirical laws for such effects; the scientific uses of such phenomena. Offered in odd-numbered years. Mr. Talley

260A–260B. Statistical Theory of Equilibrium and Transport Phenomena. (3–3) I–II.

Lecture—3 hours. Prerequisite: courses 110A and 120B. Statistical mechanical formulation of thermodynamics with application to the various

states of matter. Statistical foundation of irreversible phenomena; evaluation of the transport coefficients in fluids and metals. Mr. Talley

271. Electrodynamics of Continuous Media. (3) I.

Lecture—3 hours. Prerequisite: course 230A; Electrical Engineering 230A; Chemistry 110A. Solutions of Maxwell's equations in continuous media. Stresses and mechanical potentials of matter in constant and time varying fields. Thermodynamically based phenomenological description of electromagnetic fields in matter. Quantum mechanical interpretation of the properties of conductive and dispersive media. Mr. Chilton

290. Seminar. (1-2) I, II, III.

Seminar—2 hours.

The Staff

298. Group Study. (1-5) I, II, III.

Lecture—1-5 hours. Such topics as neutron physics, nuclear technology, advanced hydrodynamics, plasma physics, or advanced mathematics.

The Staff

299. Research. (1-12) I, II, III.

The Staff

Livermore

Upper Division Courses

105. Special Topics in Applied Science. (2) I.

Lecture—2 hours. Use of laws and concepts covered in undergraduate curricula in applied science. The variety of subjects covered will include problems of space physics, a discussion of gravity and capillary waves, and some problems in optics such as lasers.

Mr. Teller

110A. Vectors and Tensors. (4) I.

Lecture—4 hours. Prerequisite: ordinary differential equations. Algebra and calculus of finite and infinite dimensional vectors; orthonormal functions; introduction to linear equations.

Mr. Fletcher

110B. Complex Variables and Calculus of Variations. (4) II.

Lecture—4 hours. Prerequisite: course 110A. Analytic functions; contour integrals; power series, conformal mapping; Laplace transform; calculus of variations.

Mr. Fletcher

110C. Linear Equations. (4) III.

Lecture—4 hours. Prerequisite: course 110B. Solution of linear algebraic, differential, and integral equations by orthonormal expansion and Green's functions; approximation methods.

Mr. Fletcher

115. Introduction to the Use of Computers. (3) I.

Lecture—3 hours. Prerequisite: Engineering 5A; Mathematics 22B. Lectures and laboratory work on electronic computers and their application to engineering problems.

Mr. Wood

120A-120B. Chemistry for Physicists and Engineers. (3-3) I-II.

Lecture—3 hours. Prerequisite: Chemistry 1C; Mathematics 22B. Concepts of chemistry and physical chemistry, including atomic and molecular structure and the properties of liquids and solids.

Mr. Borg

123A-123B-123C. Structural Chemistry. (1-1-1) I-II-III.

Lecture—1 hour. Prerequisite: freshman chemistry and modern physics. A factual descriptive course relating chemical and physical properties of substances to their molecular or crystal structure. Selected examples of organic compounds, minerals, refractory oxides and carbides and complex ions. Generalizing correlations between structure, chemical reactivity, solubility, melting temperatures, etc.

Mr. Borg

135A. Introductory Nuclear Science and Technology. (3) I.

Lecture—3 hours. Prerequisite: Physics 121 or equivalent. Interaction of gamma rays, electrons, and heavy particles with matter; energy loss and multiple scattering formulae and their application in various media. Introductory aspects of nuclear phenomena: nuclear masses, size, energies, and decay modes.

Mr. Bloom

135B-135C. Introductory Nuclear Science and Technology. (2-2) II-III.

Lecture—2 hours. Prerequisite: course 135A. Radiation detection, charged particle technology, radiation chemistry, neutron technology, magnetic moment and spin measurement, vacuum technology.

Mr. Bloom

Graduate Courses

210A-210B. Advanced Mathematical Methods. (3-3) II-III.

Lecture—3 hours. Prerequisite: course 110C. Classification of partial differential equations, elliptic equations, hyperbolic equations in two independent variables, difference methods for initial-value problems in two independent variables, initial-value problems in more than two independent variables, difference methods for elliptic equations, Monte Carlo methods.

Mr. Killeen

211. Computer Mathematics. (3) I.

Lecture—3 hours. Prerequisite: course 110C; course 115 concurrently. Review and survey of mathematical fields fundamental to computer science. Theory of sets, Boolean algebra and propositional calculus, predicate calculus, probability and statistics, mathematical programming, general number systems.

212A-212B. Computer Languages. (3-3) II-III.

Lecture—3 hours. Prerequisite: course 211. The basic tools in the use of computers for proc-

essing data are covered. These include common subroutines such as sorting and filing, assemblies and relocatable codes, algorithmic notations and construction of algorithms. Considerations evolving from special hardware are discussed.

213A. Switching Theory. (3) II.

Lecture—3 hours. Prerequisite: course 211. This course will cover minimization techniques, switching function realization with electronic circuits, trees, storage devices, and elementary sequential machines.

213B. Computing Machines. (3) III.

Lecture—3 hours. Prerequisite: course 212A. This course will cover computing machine organization, memory systems, arithmetic units and input-output systems.

214. Computing with Symbolic Expressions. (3) I.

Lecture—3 hours. Prerequisite: course 211. Theory and practice of computing with symbolic expressions. The LISP programming language, function composition, conditional expressions, recursive functions. Writing programs to manipulate symbolic expressions. Interpreters, compilers, proving the equivalence of algorithms. Survey of symbol manipulation languages.

215. Artificial Intelligence. (3) II.

Lecture—3 hours. Prerequisite: course 211. An organized description of attempts to get computers to behave intelligently. Programs play games, solve problems, prove theorems, and deduce answers to questions from given facts. Programs that learn to make evaluations and to recognize patterns.

216. Automata Theory. (3) III.

Lecture—3 hours. Prerequisite: course 212A. This course will cover the elements of finite automata including models, graphical and table representation, equivalence, minimization, identification. Time permitting, infinite automata will be introduced and computability discussed.

220. Physical Chemistry of Solids. (3) III.

Lecture—3 hours. Prerequisite: courses 120A–120B, 260A–260B. Equations of state—heterogeneous equilibria—phase diagrams—two-body potential functions, the Debye model statistical thermodynamics of solid solutions, phase transformations and order-disorder phenomena—surface thermodynamics. Mr. Borg

221A–221B–221C. Materials Science. (3–3–3)

I-II-III.

Lecture—3 hours. Prerequisite: courses 120A–120B, 260A–260B. The facts and theories of crystal defect physics and their application to such problems as the mechanical properties of solids, radiation damage, phase trans-

formations, etc. Covers thermodynamics of point defects, diffusion, elasticity dislocation theory.

Mr. Borg, Mr. Guinan

230A–230B–230C. Structure of Matter.

(3–3–3) I-II-III.

Lecture—3 hours. Prerequisite: course 110C. 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. Mr. Johnson

231A–231B–231C. Theory of the Solid State.

(3–3–3) I-II-III.

Lecture—3 hours. Prerequisite: courses 230A–230B–230C. Structure binding and mechanical properties of crystals; dielectrics, electrons in metals, metals and alloys; magnetism, superconductivity, and semiconductors. Mr. Sahlin

232. Solid-State Electronics. (3) I.

Lecture—3 hours. Prerequisite: course 231C. Theory of semiconductors and semiconductor devices (transport properties, optical properties, p-n junctions, transistor devices, and surface states). An introduction to microwave magnetic devices and superconducting memory devices. Mr. Huen

235A–235B. Nuclear Physics. (3–3) II–III.

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. Mr. Bloom

237A–237B. Neutron Physics. (3–3) II–III.

Lecture—3 hours. Prerequisite: course 135A. Properties of neutrons, cross-sections and nuclear structure, fast neutrons, neutron resonances, fission process, thermal neutrons, neutron optics, diffraction, applications of neutron diffraction and optics to studies of the structure of matter. Mr. Kirschbaum

239A–239B. Nuclear Chemistry. (3–3) II–III.

Lecture—3 hours. Prerequisite: course 135A. Radiochemistry as an analytical technique in the study of chemical and nuclear processes: activation analysis, fission, properties of the actinides, current theories of the properties of the transactinides, radiolysis, "hot atom" chemistry, and mechanisms of biological radiation damage. Mr. Read

243A–243B. Nuclear Technology. (3–3) II, III.

Lecture—3 hours. Prerequisite: courses 135A and 110C. Physics of chain reacting systems, neutron diffusion theory, neutron moderation, transport theory, homogeneous reactors statics and dynamics, instrumentation and control, critical assemblies, pulsed neutron techniques, prompt burst reactors.

250A-250B. Continuum Mechanics. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 110C. Tensor notation, algebra, and analysis. Theory of elasticity, stress-strain relation, strain energy, reciprocity laws, elastic waves. Hydrodynamics of incompressible and compressible flows in two and three dimensions. Mr. Leith

251. Geophysical and Stellar Hydrodynamics. (3) III.

Lecture—3 hours. Prerequisite: course 250A-250B. Hydrodynamics and thermodynamics of fluids in gravitational fields with applications to the atmosphere, the ocean, and stellar models. The role of convection and radiation transport. The use of numerical models. Mr. Leith

252. Turbulence. (3) III.

Lecture—3 hours. Prerequisite: course 250A-250B. Definition, kinematics, and dynamics of turbulent flows. Hydrodynamic instability. Equilibrium theory for isotropic turbulence. Convection, diffusion, and Reynolds stress, magneto-hydrodynamic turbulence of plasmas. Two-dimensional turbulence with geophysical applications. Mr. Leith

260A-260B. Statistical Theory of Equilibrium and Transport Phenomena. (3-3) III-I.

Lecture—3 hours. Prerequisite: courses 110A and 120B. Statistical mechanical formulation of thermodynamics with application to the various states of matter. Statistical foundation of irreversible phenomena; evaluation of the transport coefficients in fluids and metals. Mr. Hoover

261A. Advanced Statistical Mechanics. (1) I.

Lecture—1½ hours. Prerequisite: course 260A-260B. The application of high speed computers to the study of equilibrium and non-equilibrium systems by the Monte Carlo and molecular dynamic techniques. Mr. Sahlin

261B. Advanced Statistical Mechanics. (1) II.

Lecture—1½ hours. Prerequisite: course 260A-260B. A discussion of the experimental study of the properties of matter at high temperatures and pressures with high explosive techniques. Mr. Sahlin

261C. Advanced Statistical Mechanics. (1) III.

Lecture—1½ hours. Prerequisite: course 260A-260B. A theoretical approach to the properties of matter with emphasis on astrophysical and geophysical application. Mr. Sahlin

ENGINEERING: CHEMICAL

J. M. Smith, Sc.D., *Chairman of the Department*
Department Office, 3094 Engineering I

Professor:

J. M. Smith, Sc.D.

Associate Professor:

Stephen Whitaker, Ph.D.

270A-270B-270C. Electromagnetic Theory.**(3-3-3) II-III-I.**

Lecture—3 hours. Prerequisite: Electrical Engineering 131B; ordinary differential equations. Electromagnetic field theory; physical properties of dielectrics and conductors; magnetic properties of materials, steady and quasi-steady currents; propagation of electromagnetic waves in vacuum and through matter.

Mr. Kidder

275A-275B-275C. Plasma Physics. (3-3-3) II-III-I.

Lecture—3 hours. Prerequisite: course 270C. The basic equations governing the behavior of a fully ionized plasma in a magnetic field; simple plasma configurations in controlled fusion research and space applications. Theory of plasma waves and instabilities. Transport coefficients and radiation phenomena. Mr. Moses

277. Plasma Kinetic Theory. (3) I.

Lecture—3 hours. Prerequisite: course 275A-275B. The derivation of plasma kinetic equations; turbulence; fluctuations; advanced radiation and transport phenomena. Mr. Bodner

278. Waves and Radiation in Plasmas. (3) III.

Lecture—3 hours. Prerequisite: course 275A-275B. Theory of propagation of waves in hot and cold magneto-plasmas; relation of wave theory to plasma instabilities; radiation processes, including collective effects, bremsstrahlung, synchrotron radiation and radiation from partially ionized atoms.

279. High-Temperature Plasmas. (3) I.

Lecture—3 hours. Prerequisite: course 275A-275B. Confinement and stability of high temperature plasmas in open and closed magnetic-field structures. Application to controlled-fusion research and space plasmas.

290. Seminar. (1-2) I, II, III.

Seminar—2 hours. The Staff

298. Group Study. (1-3) I, II, III.

Lecture—1-3 hours. Such topics as neutron physics, nuclear technology, advanced hydrodynamics, plasma physics, or advanced mathematics. The Staff

299. Research. (1-12) I, II, III

The Staff

Assistant Professors:

Richard L. Bell, Ph.D.

Neil A. Dougherty, Ph.D.

Benjamin J. McCoy, Ph.D.

Upper Division Courses**151. Material and Energy Balances. (3) I.**

Lecture—3 hours. Prerequisite: Chemistry 110A (may be taken concurrently). Use of principles of conservation of mass and energy in chemical process calculations, with emphasis on problem solving. Mr. Dougharty

152A. Chemical Engineering Thermodynamics. (3) II.

Lecture—3 hours. Prerequisite: course 151; Chemistry 110A. Application of principles of thermodynamics to chemical processes. Mr. Bell

152B. Chemical Engineering Thermodynamics. (3) III

Lecture—3 hours. Prerequisite: course 152A. Application of principles of thermodynamics to chemical processes. Mr. Smith

154A. Mass Transfer. (3) I.

Lecture—3 hours. Prerequisite: Engineering 186 (may be taken concurrently); Chemistry 110A. Fundamental concepts of mass transfer in fluids. Problems in pure diffusion and convective mass transfer. Mr. Bell

154B. Applications of Mass Transfer. (3) II.

Lecture—3 hours. Prerequisite: course 154A. Application of the principles of mass transfer and thermodynamic equilibrium to absorption, extraction, distillation and other separation processes. Mr. Bell

155A. Chemical Engineering Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 154A; course 154B (may be taken concurrently). Laboratory experiments in heat, mass, and momentum transfer and in chemical kinetics. The Staff

155B. Chemical Engineering Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 155A. Continuation of course 155A. The Staff

156A. Chemical Engineering Kinetics. (3) II.

Lecture—3 hours. Prerequisite: course 152B, 154A; and Chemistry 110C (may be taken concurrently). Chemical kinetics and introduction to homogeneous and heterogeneous reactor design. Mr. Smith

156B. Chemical Engineering Kinetics. (3) III.

Lecture—3 hours. Prerequisite: course 156A. Continuation of course 156A. Mr. Dougharty

157. Chemical Engineering Process Dynamics.

(3) III.

Lecture—3 hours. Prerequisite: courses 154B, 156A. A study of stability and the transient state of chemical processing systems. Mr. Bell

158. Chemical Engineering Process Design. (3) III.

Lecture—3 hours. Prerequisite: courses 154B and 156A. Chemical Engineering process design; optimization and process dynamics. Mr. Bell

159. Chemical Engineering Analysis. (3) I.

Lecture—3 hours. Chemical engineering applications of partial differential equations, tensors, systems of linear equations, and operational calculus. Mr. Whitaker

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: senior standing in engineering with at least a B average. Student groups may be organized in instrumentation and design problems. Students may enroll in one or more separate subjects. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: consent of instructor. The Staff

Graduate Courses**252A. Advanced Thermodynamics. (3) I.**

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. Mr. Smith

252B. Advanced Thermodynamics. (3) II.

Lecture—3 hours. Prerequisite: course 252A. Continuation of 252A with an emphasis on statistical thermodynamics. Mr. Dougharty

253A. Advanced Transport Phenomena. (3) I.

Lecture—3 hours. Prerequisite: Engineering 186. Tensor and vector methods in the formulation of the equations of mass, momentum, energy, and entropy in continuous media with particular emphasis on fluids. Applications to the formulation of rheological equations of state for viscoelastic fluids and fluid interfaces. Mr. McCoy

253B. Advanced Transport Phenomena. (3) II.

Lecture—3 hours. Prerequisite: course 253A. Continuation of 253A, with application to both differential and integral mass, momentum, and energy balances. Mr. McCoy

253C. Advanced Transport Phenomena. (3) III.

Lecture—3 hours. Prerequisite: course 253B. Continuation of 253B with special emphasis on multicomponent systems. The laws of molecular diffusion and energy transport, including the effects of concentration, temperature, electric and pressure fields. Convective mass transfer and chemically reacting flows. Mr. Bell

254. Molecular Theory of Transport Phenomena.

(3) II.

Lecture—3 hours. The transport of mass, momentum, and energy is considered from the molecular point of view. Derivations of the Boltzmann equation are considered, and solutions for special cases are discussed. Methods for calculating transport coefficients are presented. Mr. McCoy

255A. Equilibrium Stage Processing. (3) I.

Lecture—3 hours. Prerequisite: course 154B; course 252B (may be taken concurrently). The concept of equilibrium stage processing; applications to the design of distillation, absorption, and extraction processes. Mr. Dougharty

255B. Equilibrium Stage Processing. (3) II.

Lecture—3 hours. Prerequisite: course 255A. Continuation of course 255A. Mr. Bell

256A. Applied Kinetics and Reactor Design. (3) II.

Lecture—3 hours. Prerequisite: courses 156B and 252B. Application of kinetics and molecular transport rates to the design of chemical reactors, with emphasis on homogeneous systems. Mr. Dougharty

256B. Applied Kinetics and Reactor Design. (3) III.

Lecture—3 hours. Prerequisite, course 256A. Continuation of 256A, with emphasis on convective transport and heterogeneous catalytic systems. Mr. Smith

257. Rheology of Fluids. (3) III.

Lecture—3 hours. Prerequisite: course 253A. Non-Newtonian and viscoelastic behavior of polymer materials, suspensions and emulsions. Continuum theories of stress equations for materials with and without memory. Solution of simple boundary value problems and the evaluation of rheological experiments. Mr. Whitaker

258. Chemical Process Dynamics. (3) I.

Lecture—3 hours. Prerequisite: courses 154B, 156B. Unsteady-state process analysis, examples of first and second order process systems, coupling of mixed order processes including chemical reaction kinetics, mass and heat transfer and fluid mechanics, simulation of chemical processes. Mr. Bell

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

ENGINEERING: CIVIL

Don O. Brush, Ph.D., *Chairman of the Department*

Department Office, 2092 Engineering I

Professors:

Jaime Amorocho, Ph.D. (*Civil Engineering and Water Science and Engineering*)

Don O. Brush, Ph.D.

Robert H. Burgy, M.S. (*Civil Engineering and Water Science and Engineering*)

James N. Luthin, Ph.D. (*Civil Engineering and Water Science and Engineering*)

Verne H. Scott, Ph.D. (*Civil Engineering and Water Science and Engineering*)

Associate Professors:

James A. Cheney, Ph.D.

Leonard R. Herrmann, Ph.D.

Ray B. Krone, Ph.D.

Assistant Professors:

Kandiah Arulanandan, Ph.D.

James R. Hutchinson, Ph.D.

Bruce E. Larock, Ph.D.

Melvin R. Ramey, Ph.D.

Karl M. Romstad, Ph.D.

Edward D. Schroeder, Ph.D.

Chih-Kang Shen, Ph.D.

Theodor S. Strelkoff, Ph.D. (*Civil*

Engineering and Water Science and Engineering)

Lower Division Courses**10. Introduction to Surveying. (3) III.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: lower division standing in the College. 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. Mr. Goss

Upper Division Courses**131A. Structural Analysis. (3) I, III.**

Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Structural analysis of determinate and indeterminate beams, trusses and frames; influence lines, moving loads, deflection analysis. Mr. Romstad

131B. Structural Analysis. (2) I, II.

Lecture—2 hours. Prerequisite: course 131A. General force and displacement methods of analysis of structures; matrix notation, limit analysis. Mr. Romstad

132A. Structural Design: Metallic Elements. (3) II, III.

Lecture—3 hours. Prerequisite: Engineering 104B (may be taken concurrently). Metallic beams, columns, other members; analysis and

design of riveted, bolted, and welded joints; design of simple beam connections, moment resistant connections, and column base plates.

Mr. Ramey

132B. Structural Design: Concrete Elements.

(3) I, III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 132A (may be taken concurrently). Reinforced concrete beams, columns, slabs, and footings; elastic theory and ultimate design. Introduction to prestressed concrete and plastics.

Mr. Ramey

132C. Structural Design: Timber Elements. (2) III.

Lecture—2 hours. Prerequisite: course 132A. Elements of timber structures and laminated structures, including connection design.

134. Analysis and Design of Buildings. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: courses 131A, 132B, 132C. Vertical dead and live loading; earthquake and wind forces. Building code and structural requirements for the use of timber, steel frame, reinforced concrete, and brick. Supervised classroom design.

Mr. Romstad

135. Advanced Structural Analysis. (4) III.

Lecture—4 hours. Prerequisite: course 131B. Analysis of stiffened and unstiffened shell structures; limit analysis of frame structures; analysis of statically indeterminate box beams, rings, and arches. Buckling of flat plates and shells. Introduction to matrix analysis of space frames.

Mr. Cheney

137. Construction Principles. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: senior standing in engineering. A study of the construction 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.

Mr. Cheney

138. Dynamic Loads on Stationary Structures. (3) II.

Lecture—3 hours. Prerequisite: course 131B; Engineering 102B, 103B. Determination of loads on structures due to base movements (earthquakes), steady and non-steady aerodynamic forces (wind and blast), and impact and vibration forces; comparison of dynamic loads with stationary loads and determination of equivalent load factors.

Mr. Hutchinson

141. Engineering Hydromechanics. (3) I.

Lecture—3 hours. Prerequisite: Engineering 103B. Application of principles of mechanics to flows of heavy, incompressible fluids. Flow visualization, configuration of free surfaces,

streamlines, flow nets, separation, cavitation; pressure distribution in non-uniform, unsteady flow; turbulence; surface and form drag; conduit flow. Engineering approximations.

Mr. Strelkoff

142. Water Supply. (4) I, II.

Lecture—4 hours. Prerequisite: Engineering 103B or consent of instructor. Study of surface and ground water supplies; analysis for prediction of surface and ground water yields; water requirements; water supply and distribution systems including dams, reservoirs, wells, pumping plants, open channels, and pipe lines; water treatment methods and processes.

Mr. Burgy

143. Water Resources Engineering. (3) II.

Lecture—3 hours. Prerequisite: course 142. Basic concepts of water resources planning; water inventories, use, and control; water conservation measures and legislation; multiple-purpose project planning, domestic and foreign water development projects; simulation optimization and dynamic programming studies.

Mr. Scott

144. Drainage Engineering. (3) III.

Lecture—3 hours. Prerequisite: Engineering 103B. Elements of seepage through porous media; theory of drainage; depth and spacing of drains; methods of drainage investigation; project planning for drainage; engineering analysis of surface drainage.

Mr. Luthin

145. Hydraulic System Design. (3) III.

Lecture—3 hours. Prerequisite: Engineering 103B. Principles of project planning; methods of analysis and hydraulic design of storage systems, diversion structures, conveyance and regulation systems, and structures for irrigation, power and flood control projects.

Mr. Amorocho

146. Hydraulic Engineering Design Laboratory. (3) III.

Lecture—1 hour; discussion—1 hour; laboratory—3 hours. Prerequisite: course 145 (may be taken concurrently). Design and experimental analysis of hydraulic systems including storage, conveyance and energy dissipation structures; hydrologic considerations; irrigation and drainage systems; measurements and instrumentation.

Mr. Larock

147. Solid and Radioactive Waste Management. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 103B. Characteristics and amounts of solid wastes; collection systems; introduction to waste treatment processes and return of treated wastes to the environment. Origin, nature, and management of radioactive wastes.

Mr. Hart

148. Waterborne Waste Management. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 142. Introduction to industrial and domestic waterborne waste collection and treatment systems; methods of treated waste release.

Mr. Schroeder

149. Air Pollution Control. (3) III.

Lecture—3 hours. Prerequisite: course 147. Origins, characteristics, and amounts of air pollutants; atmospheric reactions and behavior of airborne wastes; methods of control. Mr. Krone

160. Highway Engineering. (3) III.

Lecture—3 hours. Prerequisite: senior standing in engineering. Highway planning, economy, surveys and plans; highway design to include highway capacity, cross section, vertical and horizontal alignment, intersections and drainage. Highway construction, grading and pavements.

Mr. Arulanandan

171. Soil Mechanics. (3) I, III.

Lecture—3 hours. Prerequisite: Engineering 104A (may be taken concurrently). 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.

Mr. Arulanandan

172. Soil Properties, Soil Behavior and Engineering Applications. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 171. Detailed study of the physical and mechanical properties of soils, including experimental determination of these properties and their engineering applications. Introduction to physicochemical principles and influence of physicochemical factors on soil behavior.

Mr. Shen

173. Soil Mechanics and Foundation Design. (3) II.

Lecture—3 hours. Prerequisite: course 172. Site exploration, bearing capacity, footing design, lateral earth pressures, retaining walls, slope stability, theory of consolidation and application of foundation design, methods of minimizing settlements and effect of settlement on structures.

Mr. Shen

174. Nuclear Civil Engineering Laboratory. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: senior standing in engineering. Phenomenology and potentials of nuclear explosives as a construction tool. Hazards associated with underground detonation. Laboratory experiments on radioisotope transport in groundwater, cratering with explosives, and slope stability. Offered in odd-numbered years.

Mr. Cheney, Mr. Talley

181. Plastic Analysis of Structures. (3) III.

Lecture—3 hours. Prerequisite: courses 131B, 132A. Structural behavior in the plastic range; methods of predicting strength and deformation in the inelastic range; analysis and design of continuous beams and frames; rules of practice for plastic design of structures.

Mr. Romstad

182. Prestressed Concrete. (3) II.

Lecture—3 hours. Prerequisite: course 132B. Analysis and design of prestressed concrete structures; statically determinate and indeterminate structures; principles and applications of ultimate strength; applications to buildings, bridges and tanks.

Mr. Ramey

198. Directed Group Study. (1–5) I, II, III.

Lecture—1–5 hours. Prerequisite: consent of the instructor. Selected topics. Students may enroll in one or more separate sections.

The Staff (Mr. Brush in charge)

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

Lecture—1–5 hours. Prerequisite: senior standing in engineering and at least a B average.

The Staff

Graduate Courses**225. Theory of Elasticity. (3) II.**

Lecture—3 hours. Prerequisite: Engineering 187. Tensor formulation of the elastic field equations. Variational principles. Introduction to nonlinear elasticity. Approximate and exact solutions for plane stress and plane strain problems. Introduction to three-dimensional problems. To be offered in even-numbered years.

Mr. Herrmann

226A. Theory of Elastic Stability. (3) II.

Lecture—3 hours. Prerequisite: Engineering 187. Basic concepts of the stability of elastic systems. Adjacent-equilibrium and minimum potential energy theories of stability. Application to bars, frames, and rings.

Mr. Brush

226B. Theory of Elastic Stability. (3) III.

Lecture—3 hours. Prerequisite: courses 226A, 227. Continuation of course 226A. Application to plates and shells. To be offered in even-numbered years.

Mr. Brush

227. Theory of Plates. (3) II.

Lecture—3 hours. Prerequisite: Engineering 187. Stress and deformation analysis of plates bent by transverse loads; applications to circular, rectangular, and other shapes.

Mr. Herrmann

228. Theory of Shells. (3) III.

Lecture—3 hours. Prerequisite: Engineering 187. Direct stresses in shells with axial symmetry. Applications to shell roofs, tanks, cylindrical shells, pipelines; bending stresses in shells. Offered in odd-numbered years.

Mr. Brush

229. Theory of Plasticity. (3) I.

Lecture—3 hours. Prerequisite: Engineering 187. Fundamentals of plasticity, the concept of yield and the associated constitutive equations in the theory of elastic-plastic solids. Variational theorems, the piecewise linear loading functions and related minimum principles. Application to earth structures, torsion and plane problems of plasticity. To be offered in even-numbered years.

Mr. Hutchinson

230. Theory of Viscoelasticity. (3) I.

Lecture—3 hours. Prerequisite: Engineering 187. Fundamentals of viscoelasticity, representation of linear viscoelastic material behavior in integral and differential operator forms. Application to earth structure, buckling, plane and axisymmetric problems. Introduction to nonlinear viscoelasticity. To be offered in odd-numbered years.

Mr. Herrmann

231. Advanced Analysis Procedures in Solid Mechanics. (3) I.

Lecture—3 hours. Prerequisite: course 131B; Engineering 187 (may be taken concurrently). Fundamentals of the finite element and related procedures. Application to torsion, plane stress, plane strain, axisymmetric, plate and shell bending, thermal stress and soil mechanics problems. Consideration of inelastic and nonlinear problems.

Mr. Herrmann

240. Water Quality. (3) I.

Lecture—3 hours. Prerequisite: Bacteriology 2 and Mechanical Engineering 185B or equivalent; Chemistry 110A (may be taken concurrently). Water quality requirements for domestic, industrial, agricultural, and recreational and wildlife water uses; properties of natural surface and ground waters; transport and fates of water-borne pollutants; methods of analysis; and transfer of pollutants in the aquatic food chain.

Mr. Krone

241. Land Quality. (2) II.

Lecture—2 hours. Prerequisite: Bacteriology 2; Chemistry 110B (may be taken concurrently) and consent of the instructor. Factors determining land quality for use in man's activities; origins of soil pollutants; uptake of pollutants by plants; interrelations of land and vegetation and qualities of air and water.

Mr. Krone

242. Air Quality. (3) III.

Lecture—3 hours. Prerequisite: Engineering 105A, 186; Chemistry 110B. Properties of the air and the atmosphere; atmospheric phenomena; factors determining air quality; origins, transport and degradation of atmospheric pollutants; effects of pollutants on men, plants, soil, and water.

Mr. Krone

243A. Water and Waste Treatment. (3) I.

Lecture—3 hours. Prerequisite: courses 148, 149; Mechanical Engineering 185B. Character-

istics of water- and airborne-wastes; treatment processes and process kinetics; treatment system design.

Mr. Schroeder

243B. Water and Waste Treatment. (3) II.

Lecture—3 hours. Prerequisite: course 243A. Continuation of course 243A. Mr. Schroeder

243C. Water and Waste Treatment Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 243B. Operation of model treatment units; measurements of waste and process effluent characteristics; evaluation of process parameters.

Mr. Schroeder

244. Environment Quality Management. (2) III.

Lecture—2 hours. Prerequisite: course 242 (may be taken concurrently), 240, 241. Fates of pollutants in the overall environment; requirements for environment quality; monitoring methods; environment quality control methods.

The Staff

247. Nuclear Civil Engineering. (3) III.

Lecture—3 hours. Prerequisite: Applied Science 246. The engineering uses of nuclear explosives; earthmoving for canals, harbors, highways and water resource development; mining; petroleum; desalination. To be offered in odd-numbered years.

Mr. Cheney

251. Advanced Topics in Structural Engineering. (3) I.

Lecture—3 hours. Prerequisite: course 131B; course 138 or Engineering 122. Analysis of indeterminate structures by force (flexibility) methods and by displacement (stiffness) methods; application to multistory buildings and aerospace structures; consideration of dynamic and inelastic effects; emphasis on methods suited for digital computer solution. To be offered in odd-numbered years.

Mr. Romstad

252. Advanced Topics in Metal Structures. (3) II.

Lecture—3 hours. Prerequisite: consent of instructor. Residual stresses, recent developments in welded structures and high-strength bolt connections, light gage and alloy steels, aluminum and other metals; aerospace structures, three dimensional space frames. To be offered in odd-numbered years.

Mr. Ramey

253. Advanced Topics in Concrete Structures. (3) I.

Lecture—3 hours. Prerequisite: consent of instructor. Advanced analysis and design of concrete folded plates, thin shells and gravity dams; yield line theory; lift slabs; effects of shrinkage and creep upon stress and deflection.

Mr. Ramey



257. Analysis of Structures under Dynamic Loading. (3) I.

Lecture—3 hours. Prerequisite: course 138. Analysis of earthquake and blast resistant structures; method of lateral forces; current research about earthquake and blast loading and structural effects. To be offered in even-numbered years.

Mr. Hutchinson

taken concurrently). Free surface flow; resistance in uniform flows; gradually and rapidly varied flows; critical depth; unsteady flows; supercritical flows; shock waves. Graphical and digital-computer solutions. To be offered in odd-numbered years.

Mr. Strelkoff

271. Advanced Topics in Surface Water Hydrology. (2) III.

Lecture—2 hours. Prerequisite: course 142; Water Science 141; consent of instructor. Analysis of hydrologic processes and procedures in water supply investigations including topics in atmospheric relationships, research methods, water balances, and water yield prediction methods.

Mr. Burgy

272. Groundwater Flow and Seepage. (3) II.

Lecture—3 hours. Prerequisite: Engineering 103B. Flow of fluids through porous media. Anisotropy. Solution of steady state problems by: mathematical analysis, models, analogs, graphical methods. Dupuit-Forchheimer assumptions. Method of images. Boussinesq's equation for transient problems, solution by Laplace transform. Seepage under dams.

Mr. Luthin

273. Groundwater Hydrology. (3) III.

Lecture—3 hours. Prerequisite: course 272. Analyses and methods of groundwater development; geophysical exploration and analysis; artificial recharge concepts; hydraulics of wells, including analytical treatment of transient flow problems; and problems of well design. Numerical and experimental methods of groundwater flow.

Mr. Scott

274. Hydraulics of Pipe Lines. (3) I.

Lecture—3 hours. Prerequisite: course 141 (may be taken concurrently); Engineering 5A or equivalent, or consent of instructor. Mechanics of liquid flow in pipes and pipe network systems. Steady flow, unsteady flow, surge and water-hammer problems. Introduction to stability and resonance phenomena. To be offered in even-numbered years.

Mr. Larock

276. Hydrologic Systems Analysis. (3) II.

Lecture—3 hours. Prerequisite: course 142 or Water Science 141 or equivalent; Mathematics 22A, 22B, 22C, 24. Theory and application of the methods of modern systems analysis and mathematical statistics to problems of hydrological prediction. Emphasis on current developments in parametric and stochastic hydrologies.

Mr. Amorocho

277. Mechanics of Open Channel Flow. (3) II.

Lecture—3 hours. Prerequisite: course 141; Mathematics 22B, 22C. Recommended: a short course in FORTRAN programming (may be

278. Hydrodynamics. (3) II.

Lecture—3 hours. Prerequisite: Mathematics 24, 185A; Mechanical Engineering 185B. Recommended: a short course in FORTRAN programming (may be taken concurrently). General equations of continuity, momentum, and energy. Stream functions; velocity potential; conformal mapping. Direct solutions for irrotational flow around bodies and in conduits; gravitational effects. To be offered in even-numbered years.

Mr. Larock

279. Advanced Mechanics of Fluids. (4) I.

Lecture—4 hours. Prerequisite: Mathematics 22B, 22C, 24; Mechanical Engineering 185B. Rotational flows. Navier-Stokes equations and solutions for laminar, viscous flows; turbulent flow and Reynolds equations, isotropy simplification, diffusion, phenomenological theories; the boundary layer approximation. To be offered in odd-numbered years.

Mr. Larock

281A. Advanced Soil Mechanics. (3) I.

Lecture—3 hours. Prerequisite: course 173. Theories of consolidation, secondary compression, stress distribution, bearing capacity, lateral earth pressures, shear strength, yielding of soils, creep, effect of type of compaction on the behavior of compacted clays.

Mr. Arulanandan

281B. Advanced Soil Mechanics. (3) II.

Lecture—3 hours. Prerequisite: course 281A. Theories of slope stability. Analysis of slope stability problems for static and dynamic loading conditions. Anisotropic stress conditions in soils. Lateral earth pressure theories. Design of anchored bulkheads.

Mr. Arulanandan

282. Advanced Soil Laboratory. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 281A. Subsurface exploration, advanced laboratory techniques including consolidation, shear strength, pore water pressure measurement, electrical properties measurement, pavement design tests, field strength and load bearing tests.

Mr. Shen

283. Physico-chemical Properties of Soils and Soil Behavior. (3) I.

Lecture—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. Conduction phenomena, deformation mechanisms, strength, swelling, compaction. Microscopic theories to explain yielding of soils.

Mr. Arulanandan

290. Seminar. (1) I, II, III.

Seminar—1 hour. Discussion of current graduate research, and guest lectures on recent advances. Oral presentation of individual study.
Mr. Larock

ENGINEERING: ELECTRICAL

Ronald F. Soohoo, Ph.D., *Chairman of the Department*

Department Office, 3004 Engineering I

Professors:

John B. Powers, Ph.D.
Ronald F. Soohoo, Ph.D.

Associate Professors:

Jack W. LaPatra, Ph.D.
Sanjit K. Mitra, Ph.D.

Assistant Professors:

Vidal R. Algazi, Ph.D.
Verne R. Brown, Ph.D.
Robert B. Green, Ph.D.
Tien C. Hsia, Ph.D.
Edward W. Kozdrowicki, Ph.D.
Herschel H. Loomis, Jr., Ph.D.
Earle W. Owen, D.Sc.
Myron F. Uman, Ph.D.

*Upper Division Courses***110A. Electronic Circuits. (3) II, III.**

Lecture—3 hours. Prerequisite: Engineering 100. Analysis of linear amplifiers; single stage and multistage amplifiers, tuned amplifiers, oscillators.
Mr. Owen

110B. Electronic Circuits. (3) I, III.

Lecture—3 hours. Prerequisite: course 110A. Nonlinear electronic circuits; large signal amplifiers, oscillators, and switching circuits.

Mr. Powers

111A. Electronics Laboratory. (2) II, III.

Laboratory—6 hours. Prerequisite: course 110A (may be taken concurrently); Engineering 101. Properties of transistors and vacuum tubes. Small-signal analysis of single-stage and multi-stage resistance-coupled and transformer-coupled class A amplifiers.
Mr. Loomis

111B. Electronics Laboratory. (2) I, III.

Laboratory—6 hours. Prerequisite: courses 110B (may be taken concurrently), 111A. Tuned amplifiers and oscillators. Switching circuits and large signal amplifiers.
Mr. Hsia

112A. Linear Systems Analysis I. (3) II, III.

Lecture—3 hours. Prerequisite: Engineering 17. Properties and classification of linear systems. Signal representation by discrete, continuous, and generalized exponentials: Fourier series, Fourier and Laplace transform methods. Convolution integral. State space techniques.

Mr. Mitra, Mr. Hsia

298. Group Study. (1-5) I, II, III.

Lecture—1-5 hours.

The Staff (Mr. Brush in charge)

299. Research. (1-12) I, II, III.

The Staff

112B. Linear Systems Analysis II. (3) I, III.

Lecture—3 hours. Prerequisite: course 112A or equivalent. Frequency analysis of linear, electrical, mechanical, and electromechanical systems. System function. Natural response and stability concepts. Introduction to feedback systems and to communication systems.

Mr. Kozdrowicki, Mr. Mitra

116. Network Analysis. (3) II.

Lecture—3 hours. Prerequisite: course 112A. Topics in modern network analysis, including two-port networks, matrix methods, graph theory, nonlinear circuits, and computer solutions.

Mr. LaPatra

117. Network Synthesis. (3) III.

Lecture—3 hours. Prerequisite: course 112A. An introduction to modern network synthesis techniques. Topics include one- and two-port networks, approximation problems, realization procedures, and filter theory.

Mr. LaPatra

130A. Introduction to Field Theory. (3) I, II.

Lecture—3 hours. Prerequisite: Mathematics 22B, 22C. Use of vector calculus in the description of steady potential and solenoidal fields with illustrations in gravitational, electrostatic, thermal, thermodynamic, elastic and fluid domains.

Mr. Powers, Mr. Uman

130B. Introduction to Field Theory. (3) II, III.

Lecture—3 hours. Prerequisite: course 130A. Oscillations and wave propagation on transmission lines, static electric and magnetic fields, potential concepts and solution of Laplace's equation, solution of wave equation and application to elementary wave guide problems.

Mr. Powers

131A. Electromagnetic Fields and Waves. (3) I.

Lecture—3 hours. Prerequisite: course 130B. Maxwell's equations and the derivation of high-frequency circuit concepts from these field equations; the skin effect.

Mr. Green, Mr. Uman

131B. Electromagnetic Fields and Waves. (3) II.

Lecture—3 hours. Prerequisite: course 131A. Propagation and reflection of electromagnetic waves and their application to transmission lines and wave guides.

Mr. Green, Mr. Uman

131C. Electromagnetic Fields and Waves. (3) III.

Lecture—3 hours. Prerequisite: course 131B. The behavior of resonant cavities, microwave networks, radiation, and antennas.

Mr. Green, Mr. Uman

133. High-Frequency Laboratory. (2) I, II.

Laboratory—6 hours. Prerequisite: course 130B. Steady-state and transient transmission line behavior; wave propagation in linear and nonlinear artificial lines; rudimentary experiments with reflex klystrons and wave guides.

Mr. Green, Mr. Uman

145A. Solid-State Electronics. (3) I.

Lecture—3 hours. Prerequisite: Physics 121. Electric and magnetic properties of solids. Topics discussed include electrical conductivity, dielectric constant, and various types of magnetism in solids.

Mr. Brown, Mr. Soohoo

145B. Solid-State Electronics. (3) II.

Lecture—3 hours. Prerequisite: course 145A. Electrical characteristics of dielectric and semiconducting materials, with application to such solid-state electronics devices as transistors, tunnel diodes, parametric amplifiers, and their associated circuits.

Mr. Brown, Mr. Soohoo

145C. Solid-State Electronics. (3) III.

Lecture—3 hours. Prerequisite: course 145A. Characteristics of magnetic materials, with application to such magnetic devices as ferrite cores, thin films, and their associated computer memory and logic circuits.

Mr. Brown, Mr. Soohoo

146. Physical Electronics. (3) I, II.

Lecture—3 hours. Prerequisite: Physics 121. Motion of charges through vacuum, gases and solids. Topics include discussion of vacuum tubes, gaseous electronic and semiconductor devices, and magnetic materials.

Mr. Soohoo

150. Instrumentation Systems. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 17. Analytical and design methods common to all instrumentation systems; dynamic response; transducers; signal conditioning.

Mr. Owen

157A. Control Systems. (3) II.

Lecture—3 hours. Prerequisite: course 112B. 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.

Mr. Hsia, Mr. Owen

157B. Control Systems. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 157A. Introduction to nonlinear and sampled data systems. Applications of digital and analog computers.

Mr. Hsia, Mr. Owen

172. Switching Circuit Theory. (3) I.

Lecture—3 hours. Prerequisite: Engineering 100. The analysis and design of switching circuits, considering relay, electronic and magnetic realizations. Introduction to sequential machines.

Mr. Mitra

173. Digital Computer Design. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 172; Engineering 5A. A study of the architecture and logic design of digital computers; laboratory applications of this study.

Mr. Loomis

184A. Principles of Communications. (3) II.

Lecture—3 hours. Prerequisite: course 112A. Mathematical representation of deterministic and random signals; elements of probability and random processes; power spectral density and correlation; application to communications.

Mr. Algazi, Mr. Kozdrowicki

184B. Principles of Communications. (3) III.

Lecture—3 hours. Prerequisite: course 184A. Probabilistic analysis of digital and analog communication systems; elements of information theory.

Mr. Algazi

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: senior standing in engineering with at least a B average. Group study of selected topics. Students may enroll in one or more separate subjects.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**212A-212B. Systems Analysis. (3-3) I-II.**

Lecture—3 hours. Prerequisite: course 112A. Properties of systems and their mathematical characteristics; state space concepts, matrix methods; multivariable systems, time-invariant systems; real time analysis, frequency methods, the identification problem, adaptive systems.

Mr. Hsia, Mr. Owen

216. Network Theory. (3) I.

Lecture—3 hours. Prerequisite: course 112B or equivalent. Foundations of network theory. Generalized network analysis, state-variable approach, energy functions, equivalent networks and normal co-ordinates, scattering matrices, integral theorems and network limitations.

Mr. Mitra

217. Passive Network Synthesis. (3) II.

Lecture—3 hours. Prerequisite: course 117 or equivalent. Advanced topics in synthesis of passive networks. Driving-point and transfer function realizations, matching networks, n-port realizations, approximation techniques.

Mr. Mitra

218. Advanced Network Theory. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 216 or equivalent. Advanced topics in network theory such as linear active networks, theory of network graphs, nonlinear and time-varying networks. Topics change from year to year.

Mr. Mitra

226A. Microwave and Quantum Electronics. (3) I.

Lecture—3 hours. Prerequisite: courses 131C, 133. Interaction between electromagnetic fields and the electron charge and spin. Topics include Lorentz force law, energy levels in matter, Zeeman splitting, magnetic resonance and relaxation, and the absorption and radiation of electromagnetic energy.

Mr. Soohoo

226B. Microwave and Quantum Electronics. (3) II.

Lecture—3 hours. Prerequisite: course 226A. Theory of interaction between electromagnetic fields and the electronic charge, with applications to microwave tubes and plasmas. Beam formation, velocity, and density modulation, plasma oscillation, space charge wave propagation in klystrons.

Mr. Soohoo

226C. Microwave and Quantum Electronics. (3) III.

Lecture—3 hours. Prerequisite: course 226A. Theory of interaction between electromagnetic fields and the electron-spin, with applications to quantum oscillators and amplifiers such as masers and lasers.

Mr. Soohoo

230A. Advanced Electromagnetic Theory. (3) I.

Lecture—3 hours. Prerequisite: course 131C or equivalent. The exact formulation of electromagnetic problems by using vector potentials and Green's functions. Applications of these techniques to radiation and transmission problems.

Mr. Green

230B. Advanced Electromagnetic Theory. (3) II.

Lecture—3 hours. Prerequisite: course 230A. Advanced topics in propagation such as propagation through anisotropic media, duct theory of propagation over the earth, ray tracing through the ionosphere.

Mr. Green

230C. Advanced Electromagnetic Theory. (3) III.

Lecture—3 hours. Prerequisite: course 230A. Advanced topics in radiation and scattering such as reception of statistically varying signals, diffracted ray theory, and quasi static solutions.

Mr. Green

245A. Applied Solid State Physics. (3) I.

Lecture—3 hours. Prerequisite: course 145C or equivalent. The physics of solids relevant to solid state applications. Topics include classical statistics, band theory of solids, electric polarization, conductivity, and magnetism in solids.

Mr. Soohoo, Mr. Brown

245B. Applied Solid State Physics. (3) II.

Lecture—3 hours. Prerequisite: course 245A. The theory of semiconductors with application to transistors. Topics include electrons, holes, mobility, and transistor circuitry. Brief discussion of superconductivity and superconducting solenoids.

Mr. Soohoo, Mr. Brown

245C. Applied Solid State Physics. (3) III.

Lecture—3 hours. Prerequisite: course 245A. The 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.

Mr. Soohoo, Mr. Brown

251. Nonlinear Control Systems. (3) III.

Lecture—3 hours. Prerequisite: course 157B and 212B. Techniques for solving nonlinear control problems; state space methods, stability theorems; Lyapunov's methods; sinusoidal describing function and on-off systems. Mr. Owen

252. Control System Optimization. (3) III.

Lecture—3 hours. Prerequisite: course 157B and 212B. Optimization of systems by the adjustment of parameters; deterministic inputs, stochastic inputs. Optimization of systems by the calculus of variations: Pontryagin's maximum principle, Bellman's principle of optimality.

Mr. Hsia

270. Sequential Machines. (3) II.

Lecture—3 hours. Prerequisite: course 172. A study of the algebraic structure theory of sequential machines and the development of sequential machine synthesis techniques.

Mr. Loomis

271. Advanced Digital System Design. (3) III.

Lecture—3 hours. Prerequisite: course 173. Advanced topics in the design of digital systems; high speed and high rate arithmetic; the state assignment problem.

Mr. Loomis

284A. Noise, Communication and Information Theory. (3) I.

Lecture—3 hours. Prerequisite: course 184B or equivalent. Fundamentals of the theory of random processes pertinent to communications, control and other physical applications. Review of probability theory. Characterization of random processes. Correlation functions and power spectra. Linear and nonlinear operations on random processes.

Mr. Algazi

284B. Noise, Communication and Information Theory. (3) II.

Lecture—3 hours. Prerequisite: course 284A. Application of statistical techniques to the areas of detection, estimation, and modulation theory. Detection problem and application to radar and digital communication. Estimation theory for

signals described by finite parameter sets. Linear and nonlinear modulation and efficient demodulators.

Mr. Algazi

284C. Noise, Communication and Information Theory. (3) III.

Lecture—3 hours. Prerequisite: course 284A. Information theory and coding. Definition of a measure of information and study of its properties. Introduction to channel capacity and error free communications over noisy channels. En-

coding and decoding of data for transmission over noisy channels.

Mr. Algazi

290. Seminar. (1) I, II, III.

Seminar—1 hour. Discussion of current research. Written and oral reports will be given.

The Staff

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

ENGINEERING: MECHANICAL

Warren H. Giedt, Ph.D., *Chairman of the Department*

Department Office, 2018 Engineering I

Professors:

Harry Brandt, Ph.D.
Clyne F. Garland, M.S.
Warren H. Giedt, Ph.D.
¹John D. Kemper, M.S.

Associate Professors:

Charles W. Beadle, Ph.D.
¹Allan A. McKillop, Ph.D.
Amiya K. Mukherjee, Ph.D.
An Tzu Yang, D.E.Sc.

Assistant Professors:

John W. Brewer, Ph. D.
Harry A. Dwyer, Ph.D.
Jerald M. Henderson, D.Eng.
Paul S. Moller, Ph.D.
Donald W. Moon, Ph.D.



Lecturer:

Arthur S. Leonard, M.S.

Upper Division Courses

111. Engineering Principles Laboratory. (4) III.

Discussion—2 hours; laboratory—4 hours. Prerequisite: Engineering 103A, 104A, 105B. Experimental investigation of the steady-state and transient behavior of thermal, mechanical, structural, and fluid systems.

Mr. Brandt

114. Kinematics of Mechanisms. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 102B. Classification of kinematic elements and mechanisms; graphical and analytical determination of displacements, velocities, and accelerations within planar mechanisms involving turning, sliding, and higher pairs. Kinematic design of cams, gears, and gear trains; intermittent-motion mechanisms.

Mr. Yang

115. Dynamics of Machinery. (3) II.

Lecture—3 hours. Prerequisite: course 114. Analysis of dynamic response of machine elements such as cams, springs, gears, and links,

with emphasis on high speed operation; gyroscopic forces in machines; balancing of machinery; introduction to dynamics of feedback control systems.

Mr. Yang

118. Mechanical Design. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 4, 104B; course 121 recommended. Application of the principles of engineering mechanics in the design of mechanical components, with special emphasis on stress concentration, theories of failure, fatigue, and fluctuating stresses.

Mr. Kemper

120. Advanced Mechanical Design. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 118. Continuation of course 118, with special emphasis on advanced design analysis; application of two-dimensional theory of elasticity to stress analysis; contact stresses; thermal stresses; elastic impact; creep; hydrodynamic lubrication and bearing design.

Mr. Yang

121. Manufacturing Methods. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Engineering 104A. Introduction to the methods employed in modern manufacturing, with particular emphasis on the interrelationships between engineering design and manufacturing methods. Introduction to the theoretical basis of metal forming.

Mr. Kemper

123A. Experimental Engineering. (2) I, II.

Laboratory—6 hours. Prerequisite: senior standing in engineering. Projects chosen to acquaint students with experimental methods in fluid mechanics, heat transfer, thermodynamics, and energy conversion.

Mr. Henderson

123B. Experimental Engineering. (2) I, III.

Laboratory—6 hours. Prerequisite: senior standing in engineering. Projects chosen to acquaint students with experimental methods in mechanical design, stress analysis, vibrations, elasticity and plasticity.

Mr. Henderson

¹ Absent on leave, 1968-69.

124. Engineering Systems Design. (3) III.

Lecture—3 hours. Prerequisite: senior standing in engineering. Synthesis of the several fields of engineering, with applications in the design of systems.

Mr. McKillop

125. Mechanics of Compressible Fluids. (3) I.

Lecture—3 hours. Prerequisite: Engineering 103B. Introductory concepts of compressible flow. Isentropic flow; normal shock waves; frictional and diabatic flow; generalized one-dimensional continuous flow.

Mr. Moller

127. Aerodynamics. (3) II.

Lecture—3 hours. Prerequisite: Engineering 103B. Lift and drag; aerodynamic load distributions; thin aerofoil and slender body theory; boundary layer control; compressibility effects; mutual interference; static and elementary dynamic stability; propulsion.

Mr. Moller

128. Aerospace Design. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 127; Engineering 104B. Design of aircraft and missile systems; influence of aerodynamic and inertial loading on structural integrity; guidance and control.

Mr. Moller

129A. Analysis and Design of Dynamics Systems. (3) II.

Lecture—3 hours. Prerequisite: senior standing in mechanical engineering or consent of instructor. Structural models for dynamic systems. The design of control systems to improve linearity, accuracy, and speed of response of dynamic systems. Design of feedback systems which maintain quality of performance in spite of unavoidable wear, corrosion, and leakage of components.

Mr. Brewer

129B. Analysis and Design of Dynamic Systems. (3) III.

Lecture—3 hours. Prerequisite: course 129A. Phenomenological models for dynamic systems. Control system design using frequency domain methods. Stability of nonlinear control systems. Introduction to the theory of state space models for multivariable systems.

Mr. Brewer

130A. Intermediate Thermodynamics. (3) II.

Lecture—3 hours. Prerequisite: Engineering 105B. Real gases. General equations of equilibrium; thermodynamic properties of fluids; vaporization and condensation.

Mr. Giedt

130B. Intermediate Thermodynamics. (3) III.

Lecture—3 hours. Prerequisite: course 130A. Introduction to kinetic theory of gases. High temperature effects; dissociation and combustion. Nonsteady-state processes.

Mr. Giedt

135. Aircraft and Rocket Propulsion. (4) II.

Lecture—4 hours. Prerequisite: Engineering 103B, 105B. Principles of fluid propulsion and

propulsive efficiency of air-breathing systems. Principles of rocket propulsion. Dynamics of launch in gravitational field and with air drag; thrust programming; and multistaging. Satellite orbital mechanics and interplanetary flight.

Mr. Leonard

140. Engineering Physical Metallurgy. (3) II.

Lecture—3 hours. Prerequisite: senior standing in engineering, or consent of instructor. Principles of treatment of metals to alter their properties for specific applications in engineering. Ferrous and nonferrous metals and alloys will be considered.

Mr. Moon

142. Crystal Structure and X-Ray Diffraction. (3) I.

Lecture—3 hours. Prerequisite: Engineering 45. Crystallography, including crystal structure and symmetry operations. Stereographic projection. Reciprocal lattice. Physics of X-rays. Theory of diffraction for X-rays, electrons and neutrons.

Mr. Moon

185A. Intermediate Fluid Mechanics. (3) II.

Lecture—3 hours. Prerequisite: Engineering 103B. Formulation of continuity, momentum, and energy equations; applications to control volumes; two-dimensional and axially symmetric potential flows.

Mr. Brandt

185B. Intermediate Fluid Mechanics. (3) III.

Lecture—3 hours. Prerequisite: course 185A. Incompressible flows of real fluids; Navier-Stokes equations; unsteady flows in conduits and open channels; flow around immersed bodies; one-dimensional compressible flow.

Mr. Brandt

198. Directed Group Study. (1-5) I, II, III.

Lecture—1-5 hours. Prerequisite: senior standing in engineering with at least a B average. Group study of selected topics.

The Staff

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

Prerequisite: consent of the instructor.

The Staff

Graduate Courses**203A-203B. Convective Heat Transfer. (3-3) II-III.**

Lecture—3 hours. Prerequisite: course 210A and Engineering 186; or Chemical Engineering 253A. Analysis of heat and momentum transfer by forced and natural convection during laminar and turbulent flow; discussion of allied topics such as boiling and condensation; current topics in heat transfer.

Mr. McKillop

204. Heat Conduction. (3) I.

Lecture—3 hours. Prerequisite: Engineering 180, 186. Steady-state and transient problems in heat conduction, using both mathematical and numerical methods of solution.

Mr. Giedt

205. Thermal Radiation. (3) I.

Lecture—3 hours. Prerequisite: Engineering 186, or consent of the instructor. The transfer of radiant energy. Geometrical and spectral characteristics of systems involving thermal radiation. Gaseous radiation. Mr. Brandt

210A. Boundary Layer Theory. (3) I.

Lecture—3 hours. Prerequisite: course 185B or consent of instructor; Mathematics 24. Introduction to boundary layer theory. Boundary layers for two-dimensional flow. Similarity solutions of boundary layer equations. Axially symmetrical and three-dimensional boundary layers. Mr. Brandt

210B. Boundary Layer Theory. (3) II.

Lecture—3 hours. Prerequisite: course 210A, or consent of instructor. Nonsteady-state boundary layers. Approximate methods for solution of boundary layer equations. Boundary layers in compressible flow. Turbulent boundary layers along a flat plate. Turbulent boundary layers with positive and negative pressure gradients. Mr. Brandt

211. Transitional and Turbulent Flows. (3) III.

Lecture—3 hours. Prerequisite: course 210B. Wave motion in fluids; stability of Couette flow, plane Poiseuille flow and boundary layers; description of turbulent flow. Structure of the turbulent energy spectrum; turbulent transport phenomena. Turbulent shear flows and their measurement; new theories in turbulence. Mr. Dwyer

212. Gas Dynamics. (3) II.

Lecture—3 hours. Prerequisite: courses 125 and 185B. Unsteady motion in one dimension; supersonic flow of real gases with viscosity and heat conductivity; mixed flow; small perturbation theory; method of characteristics; oblique shocks; similarity rules; experimental methods. Mr. Moller

220A-220B. Mechanical Vibrations. (3-3) II-III.

Lecture—3 hours. Prerequisite: Engineering 122. Applications of vibration theory to systems with many degrees of freedom and continuous systems. Oscillations in systems having nonlinear characteristics. Self-excited oscillations. Response curves and stability considerations. Mr. Kemper

221. Introduction to Random Vibration. (3) II.

Lecture—3 hours. Prerequisite: Engineering 122. Nature and statistical analysis of random vibrations. Response of physical systems to random excitation. Data processing. Mr. Beadle

222. Advanced Dynamics. (3) I.

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. Mr. Beadle

223. Advanced Kinematic Analysis. (3) I.

Lecture—3 hours. Prerequisite: course 115. Advanced kinematic analysis of planar mechanism, poles and centrodres, Euler-Savary equation, inflection circle, curvature theory, Bobillier's construction, Hartmann's construction. Four-bar coupler-point curves. Mr. Yang

224. Kinematic Synthesis of Mechanisms. (3) II.

Lecture—3 hours. Prerequisite: course 115. Introduction to curve and function synthesis. Chebychev's theorem. Structure errors. Complex number methods. Geometrical synthesis using poles, pole paths, and center point curves. Burmester's theorem. Mr. Yang

225. Spatial Mechanisms. (3) III.

Lecture—3 hours. Prerequisite: courses 115 and 223. Constraints and pairing in spatial mechanisms. Analysis of spatial mechanisms; application of vector, dual number, dual vector, matrix, quaternions, and associated computer methods. Synthesis of spatial mechanisms for path and function generation. Mr. Yang

229A. Analysis, Simulation, and Identification of Dynamic Systems. (3) II.

Lecture—3 hours. Prerequisite: course 129B or equivalent; Electrical Engineering 212B (may be taken concurrently). Analysis of distributed parameter systems. Analog and digital simulation of distributed and lumped parameter dynamic systems. Introduction to concepts of transfer state and dynamic state. Experimental determination of transfer function and state space models for dynamic systems. Mr. Brewer

229B. Analysis and Design of Dynamic Systems. (3) III.

Lecture—3 hours. Prerequisite: course 229A; Electrical Engineering 252 recommended (may be taken concurrently). Emphasis on the application of computer technology and numerical analysis theory to the design of control systems. Numerical control systems. Sampled data control systems. Optimal and sub-optimal control. Mr. Brewer

240. Theory of Crystal Dislocations. (3) I.

Lecture—3 hours. Prerequisite: course 142 or Engineering 187, or consent of instructor. Edge, screw and mixed dislocation concepts. The stress field and energy of dislocations. Force on a dislocation. Motion of dislocations and its relation to plastic deformation. Dislocation multiplication and interaction with point, line, and surface defects. Mr. Moon

241. Applications of Dislocation Theory. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 240; Engineering 188. Concepts of dislocation theory are applied to explain

plasticity of crystalline solids. Guide and climb of dislocations, imperfect 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.

Mr. Mukherjee

242. Advanced Mechanical Properties of Materials.

(4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 188, 104B. 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.

Mr. Mukherjee

243. Solid-State Phase Transformation. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: Engineering 188, 105B. The theory of alloying, kinetics of phase changes, homogeneous and heterogeneous transformation, transformation by shear, order-disorder reactions and the phase changes during the heat treatment of Iron-Carbon alloys are discussed. Offered in odd-numbered years.

Mr. Mukherjee

290. Seminar. (1) II, III.

Seminar—1 hour. Discussion of current graduate research with particular attention to validity of experimental procedures, and including oral and written presentation of a term paper.

Mr. Giedt

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

ENGLISH

Robert A. Wiggins, Ph.D., *Chairman of the Department*

Brom Weber, Ph.D., *Vice-Chairman of the Department*

Department Office, 104 Sproul Hall

Professors:

Everett Carter, Ph.D.

Thomas A. Hanzo, Ph.D.

Gwendolyn B. Needham, Ph.D.

Linda Van Norden, Ph.D.

Brom Weber, Ph.D.

Robert A. Wiggins, Ph.D.

James L. Woodress, Ph.D.

Celeste T. Wright, Ph.D.

Associate Professors:

Jay L. Halio, Ph.D.

¹Wayne C. Harsh, Ph.D., (*English and Linguistics*)

Robert Hogan, Ph.D.

Elizabeth R. Homann, Ph.D.

Assistant Professors:

Elliot L. Gilbert, Ph.D.

John O. Hayden, Ph.D.

Peter L. Hays, Ph.D.

Michael J. Hoffman, Ph.D.

Robert H. Hopkins, Ph.D.

Lindsay A. Mann, Ph.D.

Arthur E. McGuinness, Ph.D.

²Leonard Michaels, Ph.D.

Daniel S. Silvia, Jr., Ph.D.

◇ ◇ ◇

Assistant Professor:

David S. Wilson, M.A. (*Acting*)

Lecturer:

Mary A. O'Connor, M.A.

Departmental Major Advisers.—Mr. Gilbert, Mr. Halio, Mr. Hayden, Mr. Hays, Mr. Hogan, Mr. Mann, Mr. McGuinness, Mr. Silvia, Miss Van Norden.

The Major Program

Lower Division Courses.—Required: first year courses; second year, course 45; courses 46A, 46B, and 46C (these courses should be taken in order). Recommended: courses 30A, 30B, 30C; a course in philosophy; and a course in classics.

Upper Division Courses.—Thirty-six units of upper division courses, 32 of which must be in literature, including either course 117A or 117B, 12 units of courses in literature prior to 1800, and 12 units of literature after 1800. The remaining 4 units may be either in literature or in one of the following language and creative writing courses: 100A, 100B, 105A, 105B. Recommended: a course in English history.

Teaching Major.—The English teaching major in the teacher-training curriculum requires not only the departmental major but also courses 103, 105A, 105B, and 300 (which counts as 3 units of credit in education). Although these courses may be postponed to the fifth year, course 105A should be taken before course 300.

Teaching Minor.—The teaching minor consists of 32 units, including courses 45, 46A, 46B, 46C, either 30B or 30C, and at least 12 units of upper-division work including English 103, 117A or 117B, and 155B or 155C. Course 300 (which counts as 3 units of credit in education) must be taken in the senior or postgraduate year.

¹ Absent on leave, fall quarter 1968.

² Absent on leave, fall quarter 1968.

Recommended in addition to the required 32 units, especially in preparation for course 300: course 105A.

Subject Representative: Mr. Harsh

Foreign Languages.—Students who contemplate advanced study in English at Davis should keep in mind the foreign-language requirements for higher degrees. Consultation with the graduate adviser is suggested.

Honors and Honors Program.—See page 113.

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 Chairman of the Department or from the Graduate Adviser.

Lower Division Courses

1. Expository Writing. (4) I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement. Composition, the essay, paragraph structure, diction, and related topics. Frequent writing assignments will be made.

The Staff (Mr. Harsh in charge)

2. Language and Stylistics. (4) I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement. An introduction to modern inquiries into the nature and forms of the English language. Frequent writing assignments will be made.

Mr. Harsh

3. Introduction to Literature. (4) I, II, III.

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.

Mr. Mann

4A, 4B. Backgrounds for English Literature (Part I).

(4) A: I, II, III; B: I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement; course 4A is not prerequisite to 4B. This course, designed to introduce English majors to essential background material, will concentrate on such major literary works as *The Iliad*, *The Bible*, *The Aeneid*, and *The Divine Comedy*. Frequent writing assignments will be made.

Mr. McGuinness, Mr. Hayden

5. Introduction to Creative Writing. (4) I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: completion of Subject A requirement and consent of instructor. A course in the elementary principles of writing fiction and poetry. Students will be expected to experiment with a variety of forms, and will be encouraged to do free and independent work in addition to the restricted assignments of the course.

Mr. Michaels

20. Intermediate Composition. (4) I, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 3. Designed primarily for non-majors who wish to improve their skills in expository writing; the content of the course includes basic principles of rhetoric and rules of usage in present-day English.

Mr. Hays, Mr. Hopkins

25. English for Foreign Students. (5) I, II.

Lecture, 2 hours; discussion—2 hours; laboratory—1 hour. For foreign students only. Required of those who do not pass the examination in English.

Mr. Harsh in charge

26. English for Foreign Students. (5) I, II, III.

Lecture—2 hours; discussion—2 hours; laboratory—2 hours. Continuation of course 25; required of those who have taken course 25.

Mr. Harsh in charge

30A. Survey of American Literature. (4) I.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1. American literature from its seventeenth-century beginnings to 1830.

Mr. Wiggins

30B. Survey of American Literature. (4) II.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1. Nineteenth-century American literature from 1830 to 1900.

Mr. Wiggins

30C. Survey of American Literature. (4) III.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1. American literature in the twentieth century.

Mr. Wiggins

45. Critical Reading of Poetry. (4) I, II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 3. Close reading of selections from English and American poetry. Frequent written exercises.

The Staff

46A. Masterpieces of English Literature. (4) I, II.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1. Selected works of principal writers to 1640. The history of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

Mrs. O'Connor

46B. Masterpieces of English Literature. (4) II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1. Selected works of principal writers from 1640 to 1800. The history of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms.

Mrs. O'Connor

46C. Masterpieces of English Literature. (4) III.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1. Selected works of principal writers from 1800 to the present. The history

of literary conventions and backgrounds in religious thought, intellectual and social history, and related art forms. Mrs. O'Connor

47. Introduction to Modern Literature. (4) II, III.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 1. Chief twentieth-century writers of England and America.

Mr. Gilbert, Mr. Carter

Upper Division Courses

100A. Creative Writing. (4) I.

Lecture—3 hours. Prerequisite: course 3; sophomores may enroll with consent of instructor.

Mr. Michaels

100B. Creative Writing. (4) II.

Lecture—3 hours. Prerequisite: course 3; course 100A recommended. Sophomores may enroll with consent of instructor. Mr. Michaels

100C. Creative Writing. (4) III.

Lecture—3 hours. Prerequisite: course 3; sophomores may enroll with consent of instructor.

Mr. Michaels

103. Advanced Composition. (4) I, II, III.

Lecture—3 hours. Prerequisite: course 3; required of prospective high school English teachers. Survey of prose styles, the principles of prose rhetoric, and the usage patterns of present-day English grammar. Frequent written composition stressing the principles studied.

The Staff

105A. Language. (4) I, II.

Lecture—3 hours. Prerequisite: course 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 prospective English teachers.

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105B. Language. (4) II, III.

Lecture—3 hours. Prerequisite: course 3. History of the English language. Examination of the language as recorded in literary texts from Old English to present-day English. Relationship of English to other languages; development of vocabulary, phonology, and grammatical patterns. Required of prospective English teachers.

Mr. Harsh, —

110A. Introduction to Principles of Criticism. (4) I.

Lecture—3 hours. Prerequisite: course 45 or equivalent. Methods and assumptions of critical theory from Aristotle to the present. Emphasis on major contributions to the history of literary criticism.

Mr. Hayden

110B. Introduction to Principles of Criticism. (4) II.

Lecture—3 hours. Prerequisite: course 45. Continuation of 110A.

Mr. Hayden

111. Old English and Early Medieval Literature. (4) I.

Lecture—3 hours. Prerequisite: course 1. 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. Mr. Silvia

112. The Age of Chaucer. (4) II.

Lecture—3 hours. Prerequisite: course 1. The literary, religious, and social movements of the later fourteenth century in England as they are reflected in the writings of Chaucer, Langland, the *Gawain* poet, and their contemporaries; the fifteenth-century Chaucerians.

Mr. Silvia

113. Chaucer. (4) I.

Lecture—3 hours. Prerequisite: course 1. *Troilus and Criseyde*, selected *Canterbury Tales*; central ideas in the fourteenth century.

Mr. Silvia

*115. The English Renaissance. (4) III.

Lecture—3 hours. Prerequisite: course 1. Selected poetry and prose: More, Spenser, Hooker, Bacon, and others. The New Learning; the Reformation; psychological and moral concepts of the age.

116. The Age of Elizabeth. (4) II.

Lecture—3 hours. Prerequisite: course 1. Poetry of Marlowe, Shakespeare, Sidney and others; fiction of Gascoigne, Lyly, Lodge; representative plays.

117A. Shakespeare. (4) I, II.

Lecture—3 hours. Prerequisite: course 1. Selected major works.

The Staff

117B. Shakespeare. (4) II, III.

Lecture—3 hours. Prerequisite: course 1. Selected major works not included in 117A.

The Staff

*120. Earlier Seventeenth-Century Prose. (4) I.

Lecture—3 hours. Prerequisite: course 1. Bacon, Browne, and Hobbes. Sermon literature, religious and philosophical prose, and the development of prose style; the art and theory of translation, evolution of literary criticism and critical theory, emergence of the essay.

Mr. Mann

121. Earlier Seventeenth-Century Poetry. (4) II.

Lecture—3 hours. Prerequisite: course 1. Donne, Jonson, Herbert, and Marvell. The metaphysical style, its influence and history; religious poetry; the cavalier poets; the early neoclassicists.

Mr. Mann

122. Milton. (4) III.

Lecture—3 hours. Prerequisite: course 1. Selected major works, including *Paradise Lost*.

Mr. Mann

* Not to be given, 1968-69.

123. Dryden and His Contemporaries. (4) III.

Lecture—3 hours. Prerequisite: course 1. The Restoration in English Literature; Neoclassicism, Ancients versus Moderns, Pyrrhonism, the New Philosophy. Drama, criticism, and satire. Emphasis on the work of John Dryden.

ciology; aestheticism and decadence; pessimism. Tendencies continuing into the Edwardian period.
Mr. Gilbert

125A. The Age of Swift and Pope: Prose and Drama. (4) I.

Lecture—3 hours. Prerequisite: course 1. The Augustan Age: the nature of man and society—reason, satire, sentiment, and reform. Readings in Swift, Defoe, Addison, Steele, and others.

Mr. Hopkins

125B. The Age of Swift and Pope: Poetry and Criticism. (4) II.

Lecture—3 hours. Prerequisite: course 1. The Augustan Age: neoclassical rules and forms, judgment and imagination, satire and song in poetry and criticism. Readings in Pope, Gay, Addison, Prior, Thomson, and others.

Mr. McGuinness

127. Johnson and His Contemporaries. (4) III.

Lecture—3 hours. Prerequisite: course 1. Sense and Sensibility in poetry, biography, journals, fiction, comedy, and criticism. Readings in Johnson, Boswell, Goldsmith, Fielding, and others.

Mr. McGuinness

136. British Literature from 1880 to 1918. (4) I.

Lecture—3 hours. Prerequisite: course 1. Yeats, Conrad, Joyce. Aestheticism, naturalism, symbolism, and impressionism. The transition from Victorian to twentieth-century styles and attitudes.

Mr. Gilbert

***128. Prose and Poetry of the Later Eighteenth Century. (4) I.**

Lecture—3 hours. Prerequisite: course 1. Sense and Sensibility in criticism, history, philosophy and the novel. Readings in Hume, Burke, Gibbon, Sterne, Cowper, and others. The mysticism of Blake.

Mr. McGuinness

130. Early Romantic Literature. (4) I.

Lecture—3 hours. Prerequisite: course 1. Blake, Burns, Wordsworth, Coleridge, Scott; the eighteenth-century background and the development of Romantic concepts of the imagination.

Mr. Hayden

132. Later Romantic Literature. (4) II.

Lecture—3 hours. Prerequisite: course 1. Byron, Shelly, Keats. Individualism and revolt.

Mr. Michaels

141. The American Enlightenment and Its Reaction. (4) II.

Lecture—3 hours. Prerequisite: course 1. Eighteenth-century American literature; rise of neoclassicism, liberal religion, popular literature, scientific thought, satiric temper; decline of Puritan traditions; major writers, including Franklin, Edwards, Freneau, and Brackenridge.

Mr. Woodress

133. Early Victorian Literature. (4) I.

Lecture—3 hours. Prerequisite: course 1. 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.

Mr. Gilbert

Lecture—3 hours. Prerequisite: course 1. Beginnings of American romanticism; sentimentalism, Gothic vogue, cultural nationalism, Southwestern humor; prose and poetry of Brown, Bryant, Irving, Cooper, Poe, and Longstreet.

134. Later Victorian Literature. (4) III.

Lecture—3 hours. Prerequisite: course 1. Ruskin, Hardy, Hopkins, and others. The Oxford movement; the Pre-Raphaelites; art and so-

142. Early Nineteenth-Century American Literature. (4) III.

Lecture—3 hours. Prerequisite: course 1. Beginnings of American romanticism; sentimentalism, Gothic vogue, cultural nationalism, Southwestern humor; prose and poetry of Brown, Bryant, Irving, Cooper, Poe, and Longstreet.

143. Transcendentalism and Its Reaction. (4) I.

Lecture—3 hours. Prerequisite: course 1. 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.

* Not to be given, 1968-69.

144. American Literature from 1865 to 1914. (4) II.

Lecture—3 hours. Prerequisite: course 1. Religion, local color, social criticism, naturalism, *fin de siècle* aestheticism; Twain, James, Crane, Dreiser, Wharton.
Mr. Carter

146. Modern American Literature: 1914 to 1940.

(4) III.

Lecture—3 hours. Prerequisite: course 1. The Modernist movement, disillusionment, artistic experimentalism, classical revival, New Criticism, proletarian literature, romantic nationalism, European currents; Pound, Eliot, Frost, Hemingway, Fitzgerald, Crane, Faulkner, and Stevens.
Mr. Hays

***147. Modern American Literature: 1940 to the Present. (4) I.**

Present. (4) I.

Lecture—3 hours. Prerequisite: course 1. Contemporary fiction, poetry, and drama. The impact of World War II on the younger writers; experimentation and formalism in poetry and the drama.
Mr. Weber

150A. English Drama to Marlowe. (4) I.

Lecture—3 hours. Prerequisite: course 1. The development of the drama from its beginnings to the Renaissance. Miracle and mystery plays; the morality tradition. Early comedy, tragedy, and chronicle plays.
Mrs. Homann

***150B. English Drama from Marlowe to 1642. (4) II.**

Lecture—3 hours. Prerequisite: course 1. 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.
Mrs. Wright

150C. English Drama from 1642 to 1890. (4) II.

Lecture—3 hours. Prerequisite: course 1. Restoration comedy, eighteenth-century sentimental comedy, and nineteenth-century melodrama, with particular attention to plays of Congreve, Sheridan, and Boucicault.
Mr. Hays

150D. British Drama from 1890 to the Present.

(4) I.

Lecture—3 hours. Prerequisite: course 1. The rise of dramatic realism; the chief reactions against it; emphasis on Shaw, O'Casey, and Osborne.
Mr. Hogan

152. American Drama from its Beginnings to the Present. (4) II.

Lecture—3 hours. Prerequisite: course 1. Critical and historical survey of drama in America from its eighteenth-century origins with emphasis on Boucicault, Rice, O'Neill, Williams, and Miller.
Mr. Hogan

155A. The English Novel: 1700–1770. (4) I.

Lecture—3 hours. Prerequisite: course 1. Realism and the rise of the modern novel. Defoe, Richardson, Fielding, Sterne, and Smollett.
Mr. Hopkins

155B. The English Novel: 1770–1850. (4) II.

Lecture—3 hours. Prerequisite: course 1. Sense and Sensibility in the novel. Walpole, Radcliffe, Austen, Scott, Dickens, Bronte sisters.
Mrs. Needham

***155C. The English Novel: 1850–1900. (4) III.**

Lecture—3 hours. Prerequisite: course 1. Major Victorian novelists: their theory and practice. Dickens, Thackeray, Trollope, Eliot, Meredith, and Hardy.
Mr. Gilbert

155D. The English Novel: 1900 to the Present. (4) I.

Lecture—3 hours. Prerequisite: course 1. Major figures including Conrad, Joyce, and Lawrence. Impressionism, the revolt against naturalism; the experimental novel; the anti-modernist reaction.
Mr. Hoffman

158A. The American Novel to 1900. (4) II.

Lecture—3 hours. Prerequisite: course 1. The rise and development of the American novel from its eighteenth-century beginnings; Cooper, Hawthorne, Melville, Howells, Twain, James, Crane.
Mr. Hoffman

***158B. The American Novel from 1900 to Present.**

(4) III.

Lecture—3 hours. Prerequisite: course 1. Major American novelists of the twentieth century. Wharton, Dreiser, Faulkner, Hemingway, Fitzgerald, Bellow.
Mr. Hays

160. The English Lyric. (4) III.

Lecture—3 hours. Prerequisite: course 1. The history of poetic style from the sixteenth to the twentieth centuries. Major examples of the short poem in relation to intellectual history, to foreign influences, and to the development of poetic forms.

***170A. The Epic. (4) II.**

Lecture—3 hours. Prerequisite: course 1. Studies in the development of the epic.
Miss Van Norden

***170B. European Influences on the English and American Novel. (4) III.**

Lecture—3 hours. Prerequisite: course 1. Studies in the English and American novel, with special reference to continental influences.
Mr. Carter

171. English Bible as Literature. (4) III.

Lecture—3 hours. Prerequisite: course 1. Old Testament poetry and prophecy; the Gospels and certain Epistles.
Miss Van Norden

* Not to be given, 1968–69.

***175. American Literary Humor. (4) I.**

Lecture—3 hours. Prerequisite: course 1. The American humorous vision as expressed in such modes as comedy, satire, irony, and their combinations from the seventeenth century to the present, with attention given to such matters as the nature of humor and the cultural influences affecting its development.

Mr. Weber

189. Study of a Major Writer. (4) I, III.

Lecture—3 hours. Prerequisite: course 1. The artistic development of one major writer and his intellectual and literary milieu. May be repeated for credit when a different writer is studied.

Mr. Carter, Mr. Hoffman

194H. Special Study for Honors Students.

(2) I, II, III.

Prerequisite: honors status. Individual directed study leading to preparation of a long paper. May be repeated once for credit.

The Staff

198. Directed Group Study. (4) I, II, III. The Staff**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff

Graduate Courses**200. Techniques of Literary Scholarship. (4) II.**

Lecture—3 hours. The elements of bibliography with special attention to literature and discussion of the principal modes of literary investigation—critical, historical, textual, and others.

Mr. Hopkins

201. Literary Criticism. (4) II.

Lecture—3 hours. Survey of the major critics from Aristotle to the present, with emphasis on the relationship of critical theory to the history of literature.

Mr. Hayden

205. Introduction to Old English. (4) I.

Lecture—3 hours. The language of Anglo-Saxon England; readings in Old English prose and poetry.

206. Beowulf. (4) II.

Lecture—3 hours. A study of the poem and the Heroic Age of Germanic literature.

Mr. Silvia

***207. Middle and Early Modern English. (4) III.**

Lecture—3 hours. Earlier dialects; the new vocabulary; the later sound shifts and changes to the seventeenth century. Readings in illustrative documents.

210. Readings in English and American Literature.

(4) I, II, III.

Discussion—3 hours. Offered in multiple sections each quarter. Content varies according to specialty of instructor. Course is designed for students preparing for their comprehensive examinations. May be repeated for credit. The Staff

***215. Arthurian Romance. (4) I.**

Lecture—3 hours. The sources of Arthurian Romantic literature; Continental and English literary treatment; Malory's synthesis; significant changes of attitudes in post-Malory literature.

Mrs. Homann

***225. Modern Anglo-Irish Writers. (4) I.**

Lecture—3 hours.

Mr. Hogan

***230A. Studies in Major Writers: Chaucer. (4) III.**

Seminar—3 hours.

Mrs. Homann

230B. Studies in Major Writers: Milton. (4) II.

Seminar—3 hours.

***231. American-European Literary Relations. (4) I.**

Lecture—3 hours. The interchange of ideas and forms between America and Europe.

Mr. Carter

***232A. Problems of English Romantic Literature.**

(4) III.

Seminar—3 hours. Selected issues in the current study and critical assessment of Romantic literature.

Mr. Hayden

***232B. Problems of English Victorian Literature.**

(4) II.

Seminar—3 hours. Selected issues in the current study and critical assessment of Victorian literature.

Mr. Gilbert

***233. Problems in American Literature. (4) II.**

Seminar—3 hours. Selected topics for intensive investigation.

Mr. Carter

234. Drama Literature. (4) III.

Seminar—3 hours. An historical introduction to dramatic theory; the genres of tragedy, comedy, and tragicomedy.

Mr. Hogan

***235. Fiction. (4) I.**

Seminar—3 hours. Theories of fiction as reflected in the practice of writers from the eighteenth century to the present.

Mrs. Needham

***236. Poetics. (4) II.**

Seminar—3 hours. Metaphor, style, and structure in English poetry from the sixteenth century to the present.

Mr. Weber

237. Modern Critical Theory. (4) III.

Seminar—3 hours. Examination of problems in the theory underlying the practice of literary criticism from I. A. Richards and T. S. Eliot to the present.

240A-240B-240C. Medieval Literature.

(4-4) I-II-III.

Seminar—3 hours.

Mrs. Homann

* Not to be given, 1968-69.

*242A-242B-242C. Sixteenth-Century Literature.	(4-4-4) I-II-III.	Seminar—3 hours.	———
244A-244B-244C. Shakespeare.	(4-4-4) I-II-III.	Seminar—3 hours.	Mr. Halio
246A-246B-246C. Seventeenth-Century Literature.	(4-4-4) I-II-III.	Seminar—3 hours.	Miss Van Norden
248A-248B-248C. Eighteenth-Century Literature.	(4-4-4) I-II-III.	Seminar—3 hours.	Mrs. Needham
*250A-250B-250C. Romantic Literature.	(4-4-4) I-II-III.	Seminar—3 hours.	———
252A-252B-252C. Victorian Literature.	(4-4-4) I-II-III.	Seminar—3 hours.	———
*254A-254B-254C. Twentieth-Century British Literature.	(4-4-4) I-II-III.	Seminar—3 hours.	———
*256A-256B-256C. Early American Literature.	(4-4-4) I-II-III.	Seminar—3 hours.	Mr. Weber
*258A-258B-258C. American Literature: 1800 to the Civil War.	(4-4-4) I-II-III.	Seminar—3 hours.	———

ENTOMOLOGY

Oscar G. Bacon, Ph.D., *Chairman of the Department*
Department Office, 124 Robbins Hall

Professors:

Oscar G. Bacon, Ph.D.
Stanley F. Bailey, Ph.D. (*Emeritus*)
Richard M. Bohart, Ph.D.
John E. Eckert, Ph.D. (*Emeritus*)
Harry H. Laidlaw, Jr., Ph.D.
William H. Lange, Jr., Ph.D.
Leslie M. Smith, Ph.D. (*Emeritus*)
Eugene M. Stafford, Ph.D.
Francis M. Summers, Ph.D.

Associate Professors:

Norman E. Gary, Ph.D.
Albert A. Grigarick, Jr., Ph.D.
Frank E. Strong, Ph.D.

Assistant Professors:

Charles L. Judson, Ph.D.
G. A. H. McClelland, Ph.D.

260A-260B-260C. American Literature: Civil War to 1914.	(4-4-4) I-II-III.	Seminar—3 hours.	Mr. Woodress
262A-262B-262C. American Literature after 1914.	(4-4-4) I-II-III.	Seminar—3 hours.	Mr. Weber
*264A-264B-264C. Studies in Modern British and American Literature.	(4-4-4) I-II-III.	Seminar—3 hours.	Mr. Hanzo
298. Directed Group Study (1-5) I, II, III.	The Staff		
299. Individual Study. (1-4) I, II, III.	The Staff		
299D. Special Study for the Doctoral Dissertation.	(1-8) I, II, III.		The Staff
			Professional Courses
300. Problems in Teaching English Language Literature and Composition in Secondary Schools. (3) I, II.			
Lecture—2 hours. Prerequisite: senior or graduate standing; an English teaching major or minor. This course should be completed before practice teaching. The course is accepted in partial satisfaction of the requirement in education for the general secondary credential.			
301. The Teaching of English as a Foreign Language. (4) III.			
Lecture—3 hours. Methods for the use of applied linguistics in the teaching of English to nonnative speakers.			Mr. Hurford

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Professors:

Merlin W. Allen, Ph.D. (*Nematology*)
James R. Douglas, Ph.D. (*Veterinary Microbiology*)
Paul D. Hurd, Jr., Ph.D. (*Berkeley Campus*)
Michel, M. J. Lavoipierre, M.B., Ch.B. (*Veterinary Microbiology*)

Lecturers:

Herman F. Beckman, Ph.D.
Donald L. McLean, Ph.D.
Jerry A. Powell, Ph.D. (*Berkeley Campus*)
Robbin W. Thorp, Ph.D.

Departmental Major Advisers.—See Schedule and Directory Listing.

• Not to be given, 1968-69.

Bachelor of Science Major Program and Graduate Study. See pages 81 and 133.

Lower Division Courses

1. An Introduction to Entomology. (5) III.

Lecture—3 hours; laboratory—6 hours. A basic study of insects: their biology, anatomy, classification, and relation to human welfare.

Mr. Strong

10. Natural History of Insects. (3) I.

Lecture—3 hours. Designed for students not specializing in entomology. Not open for credit to students who have had course 1 but students who have taken course 10 may take course 1 for credit. Biology, taxonomy and behavior of insects. A cultural and technical course providing an introduction to the insects.

Mr. Bacon

Upper Division Courses

101. Introduction to Structure and Function in Insects. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 1. General principles of insect morphology with emphasis on the functional approach. Comparative anatomy of selected insect types.

Mr. Summers

102. Insect Physiology. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 1 or equivalent; Chemistry 8B. Recommended: course 101. Vital functions of insects and related organisms.

Mr. Judson

103. Systematic Entomology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: introductory course in zoology or entomology. The principles of taxonomy in animals; speciation; introduction to classification and nomenclature.

Mr. Bohart

104. Insect Ecology. (4) III.

Lecture—4 hours. Prerequisite: upper division standing in one of the biological sciences. Principles of ecology with examples from the insects; analysis of the insect environment; population dynamics.

109. Field Taxonomy and Ecology. (5) (Summer).

Lecture—2 hours; laboratory—24 hours. Prerequisite: an introductory course in Entomology or consent of instructor. The study of insects in their natural habitats; their identification and ecology.

Mr. Bohart, Mr. Hurd, Mr. Powell

110. Economic Entomology. (4) III.

Lecture—2 hours; laboratory—6 hours. An introductory course dealing with the identification, biology, and control of economic insects, with emphasis on those attacking agricultural crops.

Mr. Grigarick

112. Principles of Agricultural Entomology. (4) II.

Lecture—4 hours. Prerequisite: an introductory course in entomology or consent of instructor. Principles and problems in the control of insects and mites; integrated control, residues, considerations of application equipment, philosophy of sampling.

Mr. Lange

116. Biology of Aquatic Insects. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: an introductory course in entomology or consent of instructor. A study of the life histories, ecology, and identification of insects associated with streams, ponds, and lakes. Offered in even-numbered years.

Mr. Grigarick

117. Chemistry of Insecticides. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 8B, or consent of instructor. Chemical composition and reactions of insecticides; their physiological effects on plant and animal tissues.

Mr. Stafford

119. Apiculture. (3) II.

Lecture—3 hours. Biology and behavior of honeybees; communication, orientation, social organization, foraging activities, honey production, pollination activities.

Mr. Laidlaw, Mr. Gary

119L. Apiculture Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 119 (may be taken concurrently). Biology and behavior of honeybees (especially communicative behavior); fundamentals of colony management necessary for efficient agricultural use; utilization of bees in research and teaching.

Mr. Gary, Mr. Laidlaw

121. Insect Behavior. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: upper division standing in one of the biological sciences or consent of instructor. Evolution of behavior, sense organs, specific types and patterns of behavior, comparative behavior, learning, and applied aspects of behavioral phenomena. Analysis of movies on behavior.

Mr. Gary

123. Classification of Immature Insects. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: introductory course in entomology. Criteria used to identify the immature forms of the principal orders and families of insects; primary emphasis on economic groups. Offered in even-numbered years.

Mr. Lange

125. Insect Vectors of Plant Pathogens. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: one course in entomology or plant pathology, or consent of instructor. The role of insects and mites in the transmission of plant pathogens with emphasis on the biological relationships between insect vectors and plant viruses they transmit. Virus transmission techniques and approaches to control.

Mr. McLean

127. Acarology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 103 or 110. The morphology, taxonomy, and ecology of mites, with emphasis on plant and animal parasites. Offered in odd-numbered years.

Mr. Summers

130. Biological Control of Insect and Weed Pests.

(4) II.

Lecture—4 hours. Prerequisite: introductory course in entomology or consent of instructor. Theories and practices of biological control; population phenomena, and the biology of entomophagous insects. Offered in odd-numbered years.

Mr. Bacon

153. Medical Entomology. (3) III.

Lecture—3 hours. Prerequisite: one course in entomology 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 diseases of man and principles of their control.

Mr. McClelland

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to majors who are honor students of senior standing. 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.

The Staff

198. Directed Group Study. (1-5) I, II, III. (Summer)

Prerequisite: consent of instructor.

The Staff (Mr. Bacon in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III. (Summer).

The Staff (Mr. Grigarick in charge)

Graduate Courses**202. Advanced Insect Physiology. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 102 or Zoology 112, or consent of instructor. Recommended: Biochemistry 101A or 101B. Selected topics of insect physiology. Intensive study of topics of current interest, which will vary from year to year. The course may be repeated for credit. Offered in odd-numbered years.

Mr. Judson

203. Principles of Systematic Entomology. (3) II.

Lecture—3 hours. Prerequisite: course 103. Theory and philosophy of taxonomy with emphasis on phylogeny, zoogeography, and nomenclature of insects. Offered in even-numbered years.

Mr. Bohart

219. Advanced Apiculture. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 119, or consent of instructor. Advanced topics in bee biology with special consideration of morphology, genetics, caste differentiation, and artificial insemination. Offered in even-numbered years.

Mr. Laidlaw

253. Advanced Medical Entomology. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: one upper division course in entomology other than 153 and one course in microbiology; course 153 is recommended. A study in depth of one or more selected arthropod-born diseases of man with emphasis on the relationship of the physiology, behavior and population dynamics of the vector to the ecology of the disease. Emphasis in the laboratory on epidemiologic techniques relating to vectors and taxonomy of a selected group.

Mr. McClelland, Mr. Lavoipierre

275. Principles and Methods of Entomological Research. (4) II.

Lecture—2 hours; laboratory—6 hours. Techniques and purposes of the scientific method as related to the field of entomological research with emphasis on problem selection, methods of attack, and the accompanying collection, evaluation, and presentation of data. Offered in odd-numbered years.

Mr. Strong

290. Seminar. (2) I, II, III.

Seminar—2 hours.

The Staff (Mr. Strong in charge)

291. Seminar in Medical Entomology. (2) I.

Seminar—2 hours. Prerequisite: course 153. Discussions of parasitology, ecology and epidemiology related to vectors of pathogens causing disease in man and animals.

Mr. McClelland

298. Group Study. (1-5) I-II-III.

The Staff

299. Research. (1-12) I, II, III. (Summer).

The Staff (Mr. Summers in charge)

ENVIRONMENTAL HORTICULTURE—See Plant Science

EPIDEMIOLOGY AND PREVENTIVE MEDICINE

Calvin W. Schwabe, D.V.M., M.P.H., Sc.D., Chairman of the Department
Department Office, 2079 Haring Hall

Professors:

- Henry E. Adler, D.V.M., Ph.D.
- Raymond A. Bankowski, D.V.M., Ph.D.
- John B. Enright, Ph.D.
- Livio G. Raggi, D.V.M., Ph.D.
- Walter W. Sadler, D.V.M., M.P.H.
- Calvin W. Schwabe, D.V.M., M.P.H., Sc.D.

Associate Professors:

- Hans P. Riemann, D.V.M., Ph.D.
- Richard Yamamoto, Ph.D.

Assistant Professors:

- Charles E. Franti, Ph.D.
- Joyce E. Goggin, D.V.M., M.P.H.
- Araxie Z. Kilejian, Ph.D.

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Professors:

- Ralph J. Audy, M.B., Ph.D. (*San Francisco Campus*)
- Stewart H. Madin, D.V.M., Ph.D. (*Berkeley Campus*)
- Nicholas L. Petrakis, M.D. (*San Francisco Campus*)

Senior Lecturer:

- Dale R. Lindsay, Ph.D.

Lecturers:

- James R. Brownell, D.V.M.
- Robert B. Bushnell, D.V.M.
- George L. Crenshaw, D.V.M.
- Benjamin H. Dean, D.V.M., M.P.H.
- Richard C. Dorn, D.V.M., M.P.H.
- Murray B. Gardner, M.D.
- Ming-Yu Li, Ph.D.
- Bryan Mayeda, D.V.M.
- Marjan Merala, M.S.
- Arnold S. Rosenwald, D.V.M., Ph.D.
- Charles R. Schroeder, D.V.M.
- Herald G. Wixom, D.V.M.
- James H. Wommack, D.V.M.

Upper Division Courses**101. Perspectives in Veterinary Medicine. (2) I.**

Lecture—2 hours. Consideration of the present-day scope of veterinary medicine and of the role of the veterinary profession in modern society.

Mr. Schwabe

102. Biomedical Information Retrieval. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: enrollment in the School of Veterinary Medicine or consent of the instructor. The use of bibliographic tools in the biomedical sciences; the use and availability of demographic data; the application of manual and machine systems for storage and retrieval of data; and consideration of computerized systems in literature retrieval and clinical data processing.

Miss Goggin, Mr. Li, Mr. Merala, Mr. Franti

103A. Medical Statistics. (1) I.

Laboratory—3 hours. Prerequisite: upper division or graduate student status in School of Veterinary Medicine; previous or current enrollment in Mathematics 13 or permission of instructor. Use of statistics in clinical, laboratory and population medicine; graphical and tabular presentation; biomedical statistical laboratory to accompany introductory course in statistics.

Mr. Franti

103B. Medical Statistics. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 103A or permission of instructor. Regression, correlation, analysis of variance in biomedical sciences; time-dependent variation and trends; bioassay; introduction to mathematical epidemiology; non-parametric methods.

Mr. Franti

103C. Medical Statistics. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 103B, or permission of instructor. Continuation of course 103B; additional topics in bioassay; life tables and cohort studies; clinical trials; problems in sampling and surveys.

Mr. Franti

111. Animal Hygiene (3) III.

Lecture—3 hours. Prerequisite: Biology 1 or consent of the instructor. The causes, prevention, and control of animal diseases important in economic agriculture and in public health, with emphasis upon animal management factors in disease.

The Staff (Mr. Adler in charge)

140. Principles of Epidemiology. (2) II.

Lecture—1 hour; case study—2 hours. Prerequisite: sophomore standing in the School of Veterinary Medicine or permission of instructor. Introduction to medical ecology with special consideration given to modes of disease transmission and to interrelationships between those host, agent, and environmental factors which are responsible for the distributional patterns of diseases in space and time.

Mr. Schwabe

150. Food-borne Infections and Intoxications. (4) II.
Lecture—4 hours. Prerequisite: Bacteriology
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 those agents; prevention of food-borne diseases.
Mr. Riemann, Mr. York

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.
The Staff

Graduate Courses

201. Diseases of Laboratory Animals. (3) II.

Lecture—3 hours. Prerequisite: senior standing in veterinary medicine or consent of instructor. A study of infectious and noninfectious diseases of laboratory animals, including diagnostic procedures and treatment.

Mr. Edward, Mr. Adler, Mr. Bustad, Mr. Sadler, Mr. Yamamoto, Miss Kilejian, Mr. Theilen

205. Physiological and Ecological Bases of Parasitism. (3) III.

Lecture—2 lectures of 1½ hours per week. Prerequisite: general parasitology and introductory biochemistry or permission of instructor. The physiological adaptations of protozoa and helminths for parasitism with consideration given to those host factors which influence the establishment of host-parasite associations.

Miss Kilejian

207. Diseases of Pet Birds. (1) II.

Lecture—1 hour. Prerequisite: senior standing in the School of Veterinary Medicine or consent of instructor. The diagnosis and treatment of diseases of small avian species. Mr. Brownell

208. Avian Medicine. (3) II.

Lecture—3 hours. Prerequisite: junior standing in the School of Veterinary Medicine or consent of the instructor. Etiology, diagnosis, epidemiology, prevention and control of diseases of poultry, including those important to the public health.

Mr. Raggi (in charge), Mr. Adler,
Mr. Bankowski

209. Avian Medicine Laboratory. (2) I.

Lecture—1 hour; laboratory—2 hours. Prerequisite: senior standing in the School of Veterinary Medicine. Diagnosis of avian diseases by necropsy and laboratory procedures. Selected diseases, including some of bacterial, viral, and chemical etiology, are experimentally induced for study.

Mr. Yamamoto (in charge), Mr. Adler,
Mr. Raggi, Mr. Bankowski

210. Advanced Epidemiology. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: A doctoral degree (or equivalent) in

veterinary medicine, human medicine, or dental medicine, or permission of instructor. Methods for the study of diseases in populations both of lower animals and of man, with critical discussions of illustrative case examples of "classical" and contemporary epidemiological research.

Mr. Schwabe, Miss Goggin

212. Epidemiology of the Zoonoses. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 210 or permission of instructor. The epidemiological features of infections and infestations 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.

Mr. Enright

214. Comparative Epidemiology of Noninfectious Diseases. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 210 or permission of instructor. Study of the environmental and host factors which are associated with the occurrence of diseases of noninfectious or unknown etiology. Emphasis will be placed on the comparison of the epidemiologic features of these diseases in man and lower animals.

Miss Goggin

216. Mass Screening for Diseases in Populations. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 210 or permission of instructor. Recommended: Veterinary Microbiology 270. Consideration of immunodiagnostic, biochemical, and other techniques for mass screening of human and animal populations for abnormalities and disease; evaluation of their usefulness to study incidence and/or prevalence of such conditions and for application in programs of prevention and control. Mr. Yamamoto, Mr. Adler

218. Disease Control and Eradication. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 216 or permission of instructor. Studies of various approaches used to control diseases in lower animals and man. Discussions will be concerned with past successes and failures and emphasis placed on future prospects and limitations of these methods. Mr. Bankowski

240. Public Health. (3) III.

Lecture—3 hours. Prerequisite: junior standing in the School of Veterinary Medicine or permission of the instructor. Introduction to public health and to the responsibilities of the veterinarian; consideration of the roles of lower animals in the causation and perpetuation of human diseases; consideration of occupational health hazards associated with the practice of veterinary medicine.

Mr. Schwabe

250. Sanitary Control of Meat and Milk. (2) III.

Lecture—2 hours. Prerequisite: junior standing in the School of Veterinary Medicine or permission of the instructor. Principles and practice of inspection and sanitary control of meat of mammalian and avian origin and of milk.

Mr. Sadler, Mr. Riemann

290. Seminar in Epidemiology and Preventive Medicine. (1) I, II, III.

Seminar—2 hours.

The Staff

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-9) I, II, III.

The Staff

FAMILY AND CONSUMER SCIENCES

Mary Ann Morris, Ph.D., *Family and Consumer Sciences Committee, Chairman*
Committee Office, 228 Administration Building

Committee in Charge:

Duane E. Heinz, Ph.D., (*Consumer Sciences*)

David B. Lynn, Ph.D. (*Applied Behavioral Sciences*)

Mary Ann Morris, Ph.D. (*Consumer Sciences*)

Mary C. Regan, Ph.D. (*Applied Behavioral Sciences*)

Katherine W. Rossbach, M.A. (*Applied Behavioral Sciences*)

Frances J. Zeman, Ph.D. (*Nutrition*)

Participating Departments:

AGRICULTURAL ECONOMICS

J. Herbert Snyder, Ph.D., *Chairman of the Department*
Department Office, 117 Voorhies Hall

Professors:

Daniel B. De Loach, Ph.D., D.Lit.

J. Herbert Snyder, Ph.D.



Lecturers:

Ann Hertzendorf, M.S.

APPLIED BEHAVIORAL SCIENCES

Orville E. Thompson, Ph.D., *Chairman of the Department*
Department Office, TB-10

Professors:

Richard D. Cramer, M.F.A. (*Applied Behavioral Sciences and Art*)

Frederick L. Griffin, M.S. (*Emeritus*)

Glenn R. Hawkes, Ph.D.

Elwood M. Juergenson, Ph.D. (*also Coordinator of Vocational Teacher Education*)

Sidney S. Sutherland, M.S. (*Emeritus*)

Orville E. Thompson, Ph.D.



Professor:

David B. Lynn, Ph.D. (*Acting*)

Assistant Professor:

Isao Fujimoto, M.A. (*Acting, Applied Behavioral Sciences and Sociology*)

Lecturers:

Louise Bachtold, Ed.D.

Glen Burch, Ed.D.

JoAnn A. Crump, B.A.

Helen E. Giambruni, M.A.

Arlene Johnson, M.S.

Helge B. Olsen

Katherine W. Rossbach, M.A.

Jane N. Welker, M.A.

Thomas J. Witt, M.A.

Associate Professor:

Emmy E. Werner, Ph.D.

Assistant Professors:

Robert F. Barnes, Ph.D.

Mary C. Regan, Ph.D.

CONSUMER SCIENCES

Mary Ann Morris, Ph.D., *Chairman of the Department*
Department Office, 148 Home Economics Building

Professor:

Walter G. Jennings, Ph.D. (*Consumer Sciences and Food Science and Technology*)

Mary Ann Morris, Ph.D.

Sciences and Food Science and Technology)



Assistant Professor:

Duane E. Heinz, Ph.D.

Rose Marie Pangborn, M.S. (*Consumer*

Assistant Professor:

S. Haig Zeronian, Ph.D. (*Acting*)

Lecturers:

JoAnn Crump, M.A.

Harold P. Lundgren, Ph.D.

Agnes McClelland, M.A.

NUTRITION

Fredric W. Hill, Ph.D., *Chairman of the Department*
Department Office, 231 Home Economics Building

Professors:

Fredric W. Hill, Ph.D.

Lucille S. Hurley, Ph.D.

Aloys L. Tappel, Ph.D. (*Nutrition and Food Science and Technology*)

the nature of evidence in the public and academic communities; fit between University education and issues of society.

Mr. Fujimoto, Miss Regan

Associate Professors:

Magnar Ronning, Ph.D. (*Nutrition and Animal Science*)

Assistant Professors:

Betty E. Haskell, Ph.D.

Frances J. Zeman, Ph.D.

47. Orientation to Community Resources. (1) II, III.

Field trip—3 days; Seminar—two 2 hour sessions. 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.

Mr. Hawkes, Mr. Barnes

Upper Division Courses

150. Housing. (4) II.

Lecture—4 hours. Exploration of the shelter aspects of the family environment. Study of technological, social, economic and aesthetic factors affecting the nature and organization of family and community housing.

Mr. Witt

151. Community Development. (4) II.

Lecture—4 hours. Principles of community development for change agents involved in community action, extension, and development; theories and processes of social change pertinent to community analysis; the changing community in both domestic and cross-cultural settings, particularly small towns and urban neighborhoods with rural migrants.

Mr. Fujimoto

160. The Disadvantaged: Issues and Innovations. (3) II.

Seminar—3 hours. Prerequisite: 10 units of psychology, sociology, and/or anthropology. Identification and characteristics of the "invisible" segments of society with emphasis on the socially and culturally disadvantaged. Barriers encountered by these individuals and avenues for change are explored.

Mr. Lynn

Lecturers:

Rocco J. Della Rosa, Ph.D. (*Physiological Sciences*)

Marvin Goldman, Ph.D. (*Physiological Sciences*)

Curriculum Major Advisers.—See *Schedule and Directory Listing*.

Bachelor of Science Major Program and Graduate Study. See pages 81 and 133.

Applied Behavioral Sciences

Lower Division Courses

18. Scientific Bias and Social Myths. (2) I, III.

Lecture—2 hours. Assumptions and biases in different fields of knowledge, taboo topics, and

161. The Continuing Learner. (3) II.

Lecture—3 hours. Prerequisite: Education 110 (may be taken concurrently). Principles of adult education emphasizing barriers to learning, the role of non-verbal communication, the importance of self-concept in teaching adults, and the educator's role in working with non-school populations.
Mr. Barnes

190. Research Methods in Applied Behavioral Sciences. (3) I.

Lecture—3 hours. Prerequisite: Psychology 1A. Application of social sciences research methodology to multidisciplinary problems.
Miss Regan, Mr. Thompson

191. Research Design and Analysis. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 13, course 190 or consent of instructor. Survey of major types of research design in the Behavioral Sciences. Tests of statistical significance, analysis of variance, and related topics. Use of computer in data processing.
Miss Regan

198. Directed Group Study. (1-5) I, II, III. The Staff**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff

Consumer Economics**Upper Division Courses****141. Consumers and the Market. (4) II.**

Lecture—4 hours. Prerequisite: Economics 1A; Mathematics 13. Social and economic factors affecting consumer expenditures. The structure of the retail market and the effects of its performance on consumers. Agencies aiding and protecting consumers, sources of information available to consumers.

142. Social and Economic Problems of Families.

(4) III.

Lecture—4 hours. Prerequisite: Economics 1A; Mathematics 13. The management of income and expenditures by the family. The use of consumer credit, savings, investments, and insurance by families.

198. Directed Group Study. (1-5) I, II, III. The Staff**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

The Staff

Graduate Courses**247. Consumption and Standards of Living. (4) III.**

Lecture—4 hours. Prerequisite: course 141. An analytical treatment of household consumption behavior. The effects of income, prices,

and household characteristics on expenditures. Standards of income and consumption adequacy.

290. Seminar. (1) I, II, III.

Seminar—1 hour.

299. Research. (1-12) I, II, III.

The Staff

Design**Lower Division Course****6. Introduction to Design. (4) I, III.**

Lecture—4 hours. Introduction to various fields of design. Consideration of the social, cultural, and physical needs of man influencing the design of objects.
Mr. Witt

Upper Division Courses**120A. Principles of Design. (3) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: Art 2, Psychology 1A. Principles of organization and composition in design. An exploration of the subjective process of awareness.
Mr. Witt

120B. Principles of Design. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120A. Exploration of the principles of structure; development of approaches to the solution of problems involving multi-dimensional space and movement.
Mr. Olsen

120C. Principles of Design. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120A. Visual perception and organization in the interaction of color phenomena; design problems dealing with the effects and functions of color as sensation, as light and as form.
Mr. Witt

140A. History of Design. (3) III.

Lecture—3 hours. Prerequisite: Art 1A (may be taken concurrently). The history of Western design from Ancient Egypt and the Middle East through the Aegean and Classical civilizations to the waning of the Middle Ages.
Mrs. Giambruni

***140B. History of Design. (3) II.**

Lecture—3 hours. Prerequisite: Art 1B or consent of instructor. The history of Western design from the Renaissance through the Baroque, the Rococo and Neoclassicism of the eighteenth century, nineteenth century, industrialization to the emergence of modernism.
Mrs. Giambruni

143. History of Costume Design. (3) II.

Lecture—3 hours. Prerequisite: Art 1A. The history of costume design from the earliest times to the present with emphasis on both aesthetic and functional aspects.
Miss Crump

* Not to be given, 1968-69.

144. History of Interior Design. (3) III.

Lecture—3 hours. Prerequisite: one course in art history. The history of Western Interior design from its beginnings in Ancient Egypt through the Classical, Medieval, and Renaissance worlds to modern times. Mrs. Giambruni

160A, 160B, 160C. Textile Design. (3, 3, 3) I, II, III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120A, or consent of instructor. Studio projects in costume design; consideration of functional and aesthetic factors influencing the historic, contemporary and projected image of man as expressed through costume.

Miss Crump

170A-170B-170C. Costume Design. (3-3-3) II-III-I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120A, or consent of instructor. Studio projects in costume design; consideration of functional and aesthetic factors influencing the historic, contemporary and projected image of man as expressed through costume.

Miss Crump

180A-180B-180C. Interior Design. (3-3-3) I-II-III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120A, or consent of instructor. Analysis, organization and solution of interior design problems involving the social, cultural, economic and aesthetic needs of man. Consideration of the interrelationship of interior design, architectural and landscape design.

Mr. Olsen, Mr. Witt

197. Individual Problems in Design. (3) I, II, III.

Laboratory—9 hours. Prerequisite: one year upper division work in design or consent of instructor. Senior thesis: a comprehensive design problem independently pursued under the direction of a member of the faculty. The Staff

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: upper division standing and consent of instructor. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III. The Staff

Foods**Upper Division Courses****100A. Principles of Food Composition and Preparation. (3) II.**

Lecture—3 hours. Prerequisite: Chemistry 8B; one course in physics; Bacteriology 2 (may be taken concurrently). Science, sensory aspects and aesthetics of food preparation with emphasis on the chemical and physical properties of food products. Characteristics and functions of colloids, carbohydrates, lipids, and proteins in food combinations. Mrs. Pangborn

100B. Principles of Food Composition and Preparation. (3) III.

Lecture—3 hours. Prerequisite: course 100A. Chemical, physical, microbiological, and sensory aspects relating to food. Edible plant tissues, protein foods, pigments, food preservation, packaging and marketing, food regulatory agencies, science and aesthetics of food combinations, food habits, world food problems.

Mrs. Pangborn

101A. Principles of Food Composition and Preparation Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 100A, should be taken concurrently. Studies of the chemical, physical and sensory properties of foods. Characteristics and functions of basic constituents and of food systems—solutions, colloidal dispersions, gel structures, emulsions and foams.

Mrs. Pangborn

101B. Principles of Food Composition and Preparation Laboratory. (2) III.

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 100B, should be taken concurrently. Studies of the chemical, physical, microbiological and sensory aspects relating to foods. Plant, meat and flour systems, science and aesthetics of food combinations.

Mrs. Pangborn

134A-134B. Advanced Food Studies. (2-2) I, II.

Lecture—2 hours. Prerequisite: course 100B or an upper division course in food science and technology. Chemical and physical properties of food materials influencing consumption.

Mr. Heinz

135A-135B. Advanced Food Studies Laboratory. (2-2) I, II.

Laboratory—6 hours. Prerequisite: course 134A, 134B (may be taken concurrently) or consent of instructor. Laboratory methods and theories employed to study changes occurring in foods during consumer usage. Mr. Heinz

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to honors students of senior standing. 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. The Staff

197. Introduction to Research in Foods. (4) III.

Lecture—1 hour; laboratory—9 hours. Prerequisite: food majors of senior standing. Senior thesis on independent problems. Mr. Heinz

198. Directed Group Study. (1-5) I, II, III. The Staff**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III. The Staff

Graduate Courses**290. Seminar. (1) I, II, III.**

Seminar—1 hour.

The Staff

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

Home Economics Education**Professional Course****300. Teaching Home Economics in Secondary Schools. (3) I, III.**

Lecture—3 hours. Prerequisite: senior or graduate standing; a teaching major or minor in home economics. Instructional procedures and materials used in teaching home economics in secondary schools. This course should be completed before student teaching and is accepted as a part of the professional education requirements for the teaching credential.

Miss Johnson

Home Management**Upper Division Courses****140. Home Management. (4) I.**

Lecture—4 hours. Prerequisite: Psychology 1A. Management principles in relation to family resources, goals, and values.

140L. Laboratory in Home Management. (3) II, III.

Prerequisite: course 140 and senior or graduate standing. Integrated experiences in the various phases of home management.

Human Development**Lower Division Courses*****33. Laboratory Study of Young Children. (2)**

I, II, III.

Discussion—1 hour; laboratory—3 hours. Observation of individual and cultural differences among 3- to 5-year-old children in the University Laboratory Nursery School.

Mrs. Welker

Upper Division Courses**131. Development in Infancy and Early Childhood. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: Psychology 1A. Psychological and cultural factors in the development of infants and preschool children.

Mr. Lynn

133. Case Study of a Preschool Child. (2) I, II, III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Human Development 33 and 131 or consent of instructor. Intensive case study of an individual child, age 3 to 5; use of observational techniques, cumulative records, test results.

Mrs. Welker

136. Development in Middle Childhood and Adolescence. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: Psychology 1C. Psychological and cultural factors in the development of school-age children and adolescents.

Miss Werner

136L. Laboratory in Child Development. (2) II, III.

Discussion—1 hour; laboratory—3 hours. Prerequisite: Human Development 133 or 136 or Psychology 112. Laboratory work with school-age children and adolescents including supervised tutorial work with children with special needs.

Miss Werner

137. The Contemporary American Family. (4) I, III.

Lecture—4 hours. Sociological and psychological factors influencing marriage and the family in present-day society.

Mr. Hawkes

139. Diagnostic Techniques with Children. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 131 and 136, or Psychology 112. Evaluation of intelligence, personality, and special abilities of children. Class demonstration of individual tests for infants, preschool, and school-age children. Concepts of environment. Relevant research findings.

140. Emotionally Disturbed Children. (3) II.

Lecture—2 hours; discussion—1 hour. Prerequisite: courses 131 and 136, or Psychology 112. Discussion of psychosis, neurosis, behavior disorders, and learning difficulties in children.

Mrs. Bachtold

141. Physically Handicapped and Mentally Retarded Children. (3) I.

Lecture—3 hours. Prerequisite: courses 131 and 136 or Psychology 112. Etiology and diagnosis of sensory handicaps, brain damage, and mental retardation in children; education of these children.

Miss Werner

142. Gifted Children. (3) I.

Lecture—3 hours. Prerequisite: course 136 or Psychology 112 or consent of instructor. Review of research on intellectually gifted; planning appropriate classroom experiences; role of parents and teachers in encouraging creative thinking.

Mrs. Bachtold

198. Directed Group Study. (1-5) I, II, III.

The Staff
(1-5) I, II, III.

The Staff

Graduate Courses**290. Seminar. (2) I, II, III.**

Discussion—2 hours. Discussion and analysis of research in human development.

The Staff

299. Research. (1-12) I, II, III.

The Staff

* Not to be given, 1968-69.

Institution Management

Upper Division Courses

121. Institution Food Study. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Foods 100B. The principles and problems involved in the preparation and service of food in institutions.

Miss Zeman

122A. Organization and Management of Institutions. (3) II.

Lecture—3 hours. Prerequisite: Foods 100B. Recommended: course 121. Organization and administration of institutional food services; management and training of personnel; work simplification, sanitation.

Miss Zeman

122B. Food Service Planning and Control. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 122A. Design of food service facilities; selection of equipment and furnishings. Procedures employed in financial controls.

Miss Zeman

Nutrition

Lower Division Course

10. Discoveries and Concepts in Nutrition. (3) III.

Lecture—3 hours. Nutrition as a science; its historical development; the properties of foods.

Mr. Hill

Upper Division Courses

110. Principles of Nutrition. (5) II.

Lecture—4 hours; discussion—1 hour. Prerequisite: Biochemistry 101B (may be taken concurrently); a course in physiology or zoology. The fundamental principles of the nutrition of man and other animals. The nutrients in relation to physiological processes of growth, maintenance, and reproduction. Nutritional disorders.

Mr. Robinson, Mr. Grau

111. Human Nutrition. (4) III.

Lecture—4 hours. Prerequisite: course 110. Nutrition of man; critical study of nutrient requirements at various phases of the life cycle.

Mrs. Hurley

111L. Nutrition Laboratory. (1) III.

Laboratory—3 hours. Prerequisite: course 110. Laboratory study of the chemical and physiological roles of nutrients in metabolism; use of experimental animals in determining the essentiality and function of nutrients.

Mrs. Hurley

112A-112B. Nutrition and Dietetics. (4-4) I-II.

Lecture—4 hours. Prerequisite: Chemistry 8B; Physiology 2 or 101. Introduction to the principles of nutrition; study of the nutrients and their chemical and physiological roles in metabolism; nutrient requirements of man.

113. Nutrition and Dietetics Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 112B should be taken concurrently. Laboratory study of the principles of nutrition; study of the nutrients and their chemical and physiological roles in metabolism.

114. Nutrition and Development. (4) I.

Lecture—4 hours. Prerequisite: course 110 or 112B. The role of nutritional factors in embryonic and postnatal development. Mrs. Hurley

116. Nutrition and Diet Therapy. (5) I.

Lecture—5 hours. Prerequisite: course 112B; Biochemistry 101B. Physiological basis for the use of special diets. Problems in the planning and computation of dietaries for normal and pathological conditions.

Mrs. Haskell

117. Problems in Human Nutrition. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 112B; Biochemistry 101B; Chemistry 5. Evaluation of methods of assessing nutritional status in humans. Application of chemical, microbiological, chromatographic and enzymatic techniques to current problems in human nutrition.

Mrs. Haskell

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to honors students of senior standing. Independent study of selected topics under the direction of a staff member or the writing of a senior thesis.

The Staff (Mr. Hill in charge)

198. Directed Group Study. (1-5) I, II, III.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses

201A. Advanced General Nutrition. (3) I.

Lecture—3 hours. Prerequisite: Bacteriology 2; Biochemistry 101B; Physiology 110B; a course in nutrition. Advanced studies of protein and amino acid metabolism; animal energetics and energy metabolism. Comparative aspects.

The Staff (Mr. Hill in charge)

201B. Advanced General Nutrition. (3) II.

Lecture—3 hours. Prerequisite: Bacteriology 2; Biochemistry 101B; Physiology 110B; a course in nutrition. Advanced studies of problems in nutrition with emphasis on minerals; water balance. Comparative aspects.

The Staff (Mr. Kratzer in charge)

201C. Advanced General Nutrition. (3) III.

Lecture—3 hours. Prerequisite: Bacteriology 2; Biochemistry 101B; Physiology 110B; a course in nutrition. Advanced studies of metabolic function and nutritional importance of

vitamins; essential fatty acids; deficiency and degenerative diseases. Comparative aspects.

The Staff (Mrs. Hurley in charge)

***250. Concepts of Animal Nutrition. (3) II.**

Lecture—3 hours. Prerequisite: courses 201A, 201B, 201C. Dynamic interrelationships between food, animal, and environment, including concepts in food intake, digestion, absorption, and utilization of nutrients.

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff (Mr. Hill in charge)

298. Group Study. (1-5) I, II, III.

The Staff (Mr. Hill in charge)

299. Research. (1-12) I, II, III.

The Staff (Mr. Hill in charge)

Textiles and Clothing

Lower Division Course

7. Clothing Study. (2) I, III.

Lecture—2 hours. Prerequisite: Art 2, Psychology 1A. Social, psychological, and artistic aspects of clothing as related to the selection and design for individuals.

Miss Crump

Upper Division Courses

160. Introduction to Textiles. (3) II.

Lecture—3 hours. Prerequisite: Chemistry 8B. Study of plant, animal, and synthetic fibers used in textiles and of the finished textile fabrics.

Miss Morris

160L. Introduction to Textiles Laboratory. (2) II, III.

Laboratory—6 hours. Prerequisite: course 160 (may be taken concurrently). Study of plant, animal, and synthetic fibers used in textiles and of the finished textile fabrics.

Miss Morris

161. Textile Fibers. (3) III.

Lecture—3 hours. Prerequisite: course 160. The chemical and physical structure of textile fibers, and its relation to fiber and fabric properties.

Mr. Zeronian

161L. Textile Fibers Laboratory. (2) III.

Laboratory—6 hours. Prerequisite: course 161 (may be taken concurrently). Laboratory methods and procedures employed in studying chemical and physical properties of textile fibers.

Mr. Zeronian

162. Textile Fabrics. (3) I.

Lecture—3 hours. Prerequisite: course 160. The properties of fabrics as related to serviceability, comfort, and appearance.

Miss Morris

162L. Textile Fabrics Laboratory. (1) I.

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.

Miss Morris

172. Socio-Economic Factors of Clothing and Textiles. (3) II.

Lecture—3 hours. Prerequisite: Economics 1A, sociology or cultural anthropology; Psychology 1A. Clothing and textiles as related to social, economic, and psychological aspects of families and cultures.

Miss Crump

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to honors students of senior standing. 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.

The Staff

198. Directed Group Study. (1-5) I, II, III. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses

292. Seminar in Textiles. (2) I, II, III.

Seminar—2 hours. Selected topics related to the chemical and physical properties of fibers and fabrics.

The Staff

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

Professional Courses

370. Clothing Study Laboratory. (2) I, II, III.

Laboratory—6 hours. Prerequisite: course 7 (may be taken concurrently). Application of selection, design, and construction principles in different textile fabrics.

Miss McClelland

375. Clothing Design Laboratory. (2) I, II, III.

Laboratory—6 hours. Prerequisite: course 370. A knowledge of the principles of fitting and basic dress design through the medium of flat pattern designing, drafting and draping.

Miss McClelland

376. Advanced Clothing Laboratory. (3) I, III.

Laboratory—9 hours. Prerequisite: course 370. Advanced problems and tailoring techniques in clothing construction.

Miss McClelland

* Not to be given, 1968-69.

FOOD SCIENCE

Martin W. Miller, Ph.D., *Chairman of the Committee*
Committee Office, 258 Cruess Hall

Committee in Charge:

Harold W. Berg, M.S. (*Viticulture and Enology*)
Clinton O. Chichester, Ph.D. (*Food Science and Technology*)

Edwin B. Collins, Ph.D. (*Food Science and Technology*)
Duane E. Heinz, Ph.D. (*Consumer Science*)
Martin W. Miller, Ph.D. (*Food Science and Technology*)

Participating Departments:

FOOD SCIENCE AND TECHNOLOGY

Clinton O. Chichester, Ph.D., *Chairman of the Department*
Department Office, 126A Cruess Hall

Professors:

Clinton O. Chichester, Ph.D.
Edwin B. Collins, Ph.D.
Walter L. Dunkley, Ph.D.
Robert E. Feeney, Ph.D.
Eugene L. Jack, Ph.D. (*Emeritus*)
Walter G. Jennings, Ph.D. (*Food Science and Technology and Consumer Sciences*)
George L. Marsh, M.S. (*Emeritus*)
Emil M. Mrak, Ph.D.
Thomas A. Nickerson, Ph.D.
Herman J. Phaff, Ph.D. (*Food Science and Technology and Bacteriology*)
Chester L. Roadhouse, D.V.M. (*Emeritus*)
Lloyd M. Smith, Ph.D.
Clarence Sterling, Ph.D.
George F. Stewart, Ph.D.
Aloys L. Tappel, Ph.D. (*Food Science and Technology and Nutrition*)
Nikita P. Tarassuk, Ph.D. (*Emeritus*)
Reese H. Vaughn, Ph.D.
John R. Whitaker, Ph.D.

Morris H. Woskow, Ph.D. (*Food Science and Technology and Psychology*)



Professors:

Maynard A. Amerine, Ph.D. (*Viticulture and Enology*)
Harold W. Berg, M.S. (*Viticulture and Enology*)
James F. Guymon, Ph.D. (*Viticulture and Enology*)
Samuel B. Lepkovsky, Ph.D. (*Poultry Husbandry; Berkeley Campus*)
Edward B. Roessler, Ph.D. (*Mathematics*)
Joseph M. Smith, Sc.D. (*Chemical Engineering*)
A. Dinsmoor Webb, Ph.D. (*Viticulture and Enology*)

Associate Professors:

John C. Harper, D.Sc. (*Agricultural Engineering*)
Daniel W. Peterson, Ph.D. (*Poultry Husbandry*)

Lecturers:

A. Wade Brant, Ph.D.
Donald G. Crosby, Ph.D.
Dieter W. Gruenwedel, Ph.D.
Wendell W. Kilgore, Ph.D.
Bor S. Luh, Ph.D.
Vernon L. Singleton, Ph.D. (*Viticulture and Enology*)

VITICULTURE AND ENOLOGY

Harold W. Berg, M.S., *Chairman of the Department*

Department Office, 1023 Wickson Hall

Professors:

Maynard A. Amerine, Ph.D.
 Harold W. Berg, M.S.
 James A. Cook, Ph.D.
 James F. Guymon, Ph.D.
 Klayton E. Nelson, Ph.D.
 Harold P. Olmo, Ph.D.
 Robert J. Weaver, Ph.D.
 A. Dinsmoor Webb, Ph.D.
 Albert J. Winkler, Ph.D., LL.D. (*Emeritus*)

Associate Professor:

Lloyd A. Lider, Ph.D.

Assistant Professor:

Ralph E. Kunkee, Ph.D.

◇ ◇ ◇

Professors:

Frederick T. Addicott, Ph.D. (*Agronomy*)
 George L. Marsh, M.S. (*Emeritus; Food
Science and Technology*)

Lecturers:

W. Mark Kliewer, Ph.D.
 Cornelius S. Ough, B.S.
 Vernon L. Singleton, Ph.D.

Departmental Major Advisers. — See *Schedule and Directory Listing*.

Bachelor of Science Major Program and Graduate Study. See pages 81 and 133.

Food Science and Technology

Lower Division Course

1. Introduction to Food Science. (3) I.

Lecture—3 hours. Historical and philosophical aspects of food processing and its relationships to man's health and well-being. World's food supply and its use by human populations. Trends in the processing, preservation, and utilization of food.

Messrs. Amerine, Stewart, Vaughn

Upper Division Courses

100. Processing Agricultural Products. (5) I.

Lecture—4 hours; laboratory—3 hours. Prerequisite: Biology 1; Chemistry 8B. Processing of foods, feeds, and fibres to provide desirable qualities, such as convenience, economy and utility. Principles used in raw product selection, conversion, preservation, and quality control.

Mr. Miller, Mr. Dunkley

101. Biochemistry and Food Science. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101B. Topics on enzymes, proteins, lipids and

vitamins. Biochemical principles related to food composition, preservation and processing.

Mr. Tappel

102. Biochemistry and Technology of Malting and Brewing. (2) III.

Lecture—2 hours. Prerequisite: Biochemistry 101B. Special attention is paid to the complex biochemistry of raw materials, malting, brewing, and fermentation as it affects industrial practice. Field trips and pilot brewing by arrangement.

Mr. Lewis

103. Physical and Chemical Methods for Food Analysis. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biochemistry 101B; Chemistry 5; Chemistry 8B (may be taken concurrently). Theory and application of physical and chemical methods for analyzing foods.

Mr. Whitaker, Mr. Bernhard

104A. Food and Industrial Microbiology. (2) II.

Lecture—2 hours. Prerequisite: Bacteriology 2; Chemistry 8B. Taxonomy, physiology, ecology, and control of microorganisms important in manufacturing and ripening foods, producing defects, and spoilage; disposing of wastes and protecting public health; bacteriophage action and control.

Mr. Collins and Mr. Vaughn

104B. Food and Industrial Microbiology. (2) III.

Lecture—2 hours. Prerequisite: course 104A. Continuation of course 104A with emphasis on destruction of microorganisms, and food-borne infections.

Mr. Collins and Mr. Vaughn

105A–105B. Food and Industrial Microbiology Laboratory. (2–2) II–III.

Laboratory—6 hours. Prerequisite: courses 104A–104B (should be taken concurrently); Bacteriology 2; Chemistry 8B. Laboratory procedures selected to follow subject matter sequence of course 104A–104B.

Mr. Collins and Mr. Vaughn

106. Industrial Fermentation. (3) I.

Lecture—3 hours. Prerequisite: Bacteriology 2. Microorganisms and their activity in relation to industrial processes such as baking, brewing, and the production of industrial solvents, vitamins, enzymes, drugs, and other chemicals. For laboratory experience in this field, students may register in Food Science and Technology 106L.

Messrs. Lewis, Phaff, Kunkee

106L. Food and Industrial Microbiology Summer Laboratory. (3)

Laboratory—90 hours total. Prerequisite: A course in industrial fermentation. Microorgan-

isms and their activities in relation to industrial processes such as baking; brewing; production of industrial alcohol, yeasts, solvents, vitamins, enzymes, antibiotics, and other drugs.

Mr. Lewis

107A. Analysis of Variance as Applied to Sensory Evaluation Problems. (1) II.

Lecture, Discussion and Laboratory—2 hours a week. Prerequisite: Mathematics 13 or its equivalent. Intensive review of hypothesis testing and the analysis of variance.

Mr. Roessler, Mr. Woskow, Mrs. Pangborn

107B. Principles of Sensory Evaluation of Foods. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 107A or the ability to use analysis of variance. Nature of sensory response with emphasis on taste and smell as related to foods; design and methodology of small panel and consumer panel testing; and application of appropriate mathematical procedures.

Mr. Amerine, Mr. Woskow, Mrs. Pangborn

108A. Food Plant Sanitation. (2) I.

Lecture—2 hours. Prerequisite: Chemistry 1A. Principles of water conditioning and water treatment, chemical sanitizing agents, metallic corrosion, fundamental concepts in the disposal of wastes, and discussion of other factors relating to food plant sanitation. Mr. Jennings

108B. Food Plant Sanitation. (2) II.

Lecture—2 hours. Prerequisite: Chemistry 8B. Principles of hard-surface detergency; detergent classification and formulations, soil and substrate considerations, energy relationships in detergency, and theories and mechanisms of detergency. Mr. Jennings

109. Quality Control for Food Processing Operations. (3) III.

Lecture—3 hours. Prerequisite: course 103, and Mathematics 13. Objectives of quality control; measurement of quality attributes; development of grades and standards of quality; sampling and inspection techniques; statistical procedures; application of analyzed data to control of quality. Mr. Bernhard and Mr. L. M. Smith

110A. Engineering Principles of Food Processing. (3) I.

Lecture—3 hours. Prerequisite: Mathematics 16C; Physics 2B, 3B. Application of the conservation of mass and energy to food processing. Elements of engineering thermodynamics, fluid mechanics, and heat transfer.

Messrs. Harper, Dunkley, Guymon

110B. Engineering Principles of Food Processing. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110A. Introduction to process

principles, including counter-current operation and equilibrium stage processing. Treatment of heat exchanger, evaporation, and refrigeration unit operations. Field trips to processing plants.

Messrs. Harper, Dunkley, Guymon

110C. Engineering Principles of Food Processing. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 110B. Principles of psychrometry and the unit operations of dehydration and distillation; process control and economic considerations. Field trips to selected processing plants.

Messrs. Harper, Dunkley, Guymon

113. Structure of Food Materials. (3) I.

Lecture—2 hours; laboratory—1 hour. Anatomical features and structural properties of foods; histochemical tests of food tissues; rheological characteristics; food texture.

Mr. Sterling

114. Principles of Processing Fruit and Vegetable Products. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Bacteriology 2; Chemistry 8B. Technical principles relating to processing operations used in the commercial preservation of fruit and vegetable products; theory and practical applications; field trips.

Mr. Marsh

118. Principles of Dairy Processing. (3) I.

Lecture—3 hours. Prerequisite: Bacteriology 2; Chemistry 8B. Principles of selected processes, including pasteurization, sterilization, homogenization, separation and condensing, and their application in the processing of fluid dairy foods.

Mr. Dunkley

119. Principles of Dairy Processing. (3) III.

Lecture—3 hours. Prerequisite: Bacteriology 2; Chemistry 8B. Principles of freezing, drying, crystallization, emulsification, stabilization, and fermentation and their application in the manufacture of frozen, dried and cultured dairy products, cheese, and butter.

Mr. Nickerson

122. An Introduction to Enzymology. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biochemistry 101B. Principles of purification, physicochemical and enzymatic properties, and utilization with emphasis on enzymes which are used, or have potential use, in the food and beverage industries.

Mr. Whitaker

***130. Chemistry of Milk and Dairy Products. (3) III.**

Lecture—3 hours. Prerequisite: Biochemistry 101A. The chemistry of milk constituents; physical and chemical properties of milk; and the changes that occur during the processing and storage of dairy products, with emphasis on quality. Offered in even-numbered years.

* Not to be given, 1968-69.

190. Recent Advances in Food Technology. (1) I.

Lecture—1 hour. Prerequisite: two courses in Food Science and Technology. Assigned topics, reports, and discussions concerning recent advances in food technology. Mr. Chichester

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. 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.

The Staff

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Chichester in charge)

199. Special Study for Advanced Undergraduates.

(1-6) I, II, III.

The Staff (Mr. Chichester in charge)

Graduate Courses**210A. Proteins: Functional Activities and Interactions. (3) II.**

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.

Mr. Feeney

210B. Proteins: Functional Activities and Interactions. (2) III.

Lecture—2 hours. Prerequisite: course 210A or Biochemistry 201A. The relationships of structure of proteins to their biological functions. Structural proteins, complexing proteins, and catalytic proteins in plant and animal materials and products.

Mr. Feeney

211. Chemistry of the Food Lipids. (3) II.

Lecture—3 hours. Prerequisite: Biochemistry 101A. Chemical constitution, molecular structure, and stereo chemistry of the fats, phospholipids, and related compounds. Methods of isolation, characterization, and synthesis. Relation of molecular structure to physical properties.

Mr. Smith

213. Macromolecular Gels. (2) II.

Lecture—2 hours. Prerequisite: Biochemistry 101A. Structural interrelationship of water with typical biological polymers in gels; xerogels; gel properties and methods of study. Mr. Sterling

220. The Natural Coloring Matters. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: 3 units of biochemistry or plant biochemistry; 3 units of upper division organic chemistry. Chemistry of natural pigments and related compounds; spectrophotometric and

chromatographic techniques; special emphasis on pigments in relation to foods.

Mr. Chichester

250A-250B. Isolation and Characterization of Trace Volatiles. (2) I, II.

Lecture—2 hours. Prerequisite: consent of the instructor. Preparation of volatile concentrates suitable for gas chromatographic separations; influence of the design and type of chromatograph on the efficiency of separation; techniques of trapping and reinjecting chromatographic fractions; and spectrometric characterization of the separated compounds.

Mr. Jennings

290. Seminar. (1) I, II, III.

Seminar—1 hour.

Mr. Mazelis

291. Current Research Literature. (1) I, II, III.

Seminar—1 hour. Prerequisite: graduate student standing. Critical reading, evaluation, and presentation of papers from the literature as well as results of own research with emphasis on those dealing with all aspects of proteins, enzymes and nucleic acids.

The Staff

298. Group Study. (1-5) I, II, III.

Directed study on food chemistry, food microbiology, food processing or sensory evaluation.

The Staff (Mr. Chichester in charge)

299. Research. (1-12) I, II, III.

Prerequisite: graduate standing.

The Staff (Mr. Chichester in charge)

Viticulture and Enology**Lower Division Course****3. Introduction to Wine Making. (3) II.**

Lecture—3 hours. An introduction to wine technology, including history, fermentation, production practices, wine types, and the wine industry of California and other wine producing areas.

Mr. Singleton, Mr. Amerine

Upper Division Courses**124. Enology: Wine Production. (3) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: Bacteriology 2; Chemistry 5, 8B. Recommended: Chemistry 9, 109B; Food Science and Technology 107; Plant Science 2; and course 3. The principles and practice of making the various standard types of wines, with special reference to the grape varieties used and the methods of vinification required for each.

Mr. Webb

125. Principles of Sensory and Chemical Analysis of Wines; Wine Types. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: Bacteriology 2; Chemistry 5, 8B. Recommended: Chemistry 9, 109B; Food Science

and Technology 107; Plant Science 2; and courses 3, 124. Principles of sensory and chemical examination of wines; wine regions of the world; principles of production of sparkling wines and vermouth. Mr. Amerine

126. Enology: Wine Processing. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: Bacteriology 2; Chemistry 5, 8B. Recommended: Chemistry 9, 109B; Food Science and Technology 107; Plant Science 2; and courses 3, 124, 125. Principles and theory of nonbacterial disorders: metal, tartrate, protein, color, oxidative and their control by clarification, refrigeration, filtration and ion-exchange.

Mr. Berg

140. Distillation Principles and Brandy Technology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 5, 8B. Recommended: Chemistry 109B; Food Science and Technology 110A. Principles of distillation including engineering aspects and problems with emphasis upon the alcohol-water system and distillation of wines; brandy types, sensory and chemical analysis and production factors. Offered in odd-numbered years.

Mr. Guymon

FOODS—See Family and Consumer Sciences

FOREIGN LITERATURE IN TRANSLATION

The following courses are open to students throughout the campus. The readings are in English. Refer to departmental listing for descriptions of courses.

Classics

139A and 139B. Greek Literature in Translation.

140. Latin Literature in Translation.

141. Greek and Roman Comedy.

Dramatic Art

20. Introduction to Dramatic Art.

158A, 158B. World Drama.

159. Contemporary Drama.

English

170A. The Epic.

170B. European Influences on the English and American Novel.

171. English Bible as Literature.

French

***141. Gide and Proust.**

* Not to be given, 1968-69.

191. Proseminar in Enology. (1) I, II, III.

Lecture—1 hour. Prerequisite: consent of instructor. Reports and discussion of recent advances in enology. Mr. Amerine, Mr. Berg

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Berg in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

The Staff (Mr. Berg in charge)

Graduate Courses

217. Microbiology of Wine Production. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: Bacteriology 2; Biochemistry 101A; Chemistry 5, 8B. Recommended: course 3 or 124, 125, 126, and an upper division course in Bacteriology. Nature, development, physiology, biochemistry, and control of yeasts and bacteria involved in the making, ageing, and spoilage of wines.

Mr. Kunkee

290. Seminar. (1) II.

Seminar—1 hour. Prerequisite: consent of instructor.

Mr. Webb

299. Research. (1-6) I, II, III.

The Staff (Mr. Berg in charge)

***142. French Novel from Malraux to the Nouveau Roman.**

150. Masterpieces of French Literature.

German

110. Masterpieces of German Prose from Goethe to Kafka.

111. Masterpieces of German Drama from Lessing to Brecht.

112. Masterpieces of German Poetry from Walther von der Vogelweide to Rilke.

114. Goethe's Faust.

115. German Literature of the Twentieth Century up to the Second World War.

116. German Literature of the Twentieth Century since the Second World War.

117. Kafka and Dada.

118. Brecht.

Russian

39. Great Russian Writers.
 40. Survey of Russian Literature to 1800.
 41. Survey of Russian Literature: Nineteenth Century.
 42. Survey of Russian Literature: Twentieth Century.

FRENCH

Max Bach, Ph.D., *Chairman of the Department*
 Department Office, 515 Sproul Hall

Professor:

Max Bach, Ph.D.

Associate Professor:

Marshall Lindsay, Ph.D.

Assistant Professors:

Edward M. Bloomberg, Ph.D.
 Alfredo A. Bonadeo, Ph.D.
 Gerald Herman, Ph.D.
 George H. Keith, Ph.D.
 Ruth B. York, Ph.D.
 Emily Zants, Ph.D.



Professor:

Jean P. Hytier, DèsL. (*Visiting*)

Associate Professor:

Adrienne D. Hytier, Ph.D. (*Visiting*)

Assistant Professor:

David S. Wilson, M.A. (*Acting*)

Lecturer:

William P. Galvin, M.A.

French

Departmental Major Advisers.—Mr. Bloomberg, Mr. Herman, Miss York.

Graduate Adviser.—Mr. Bach.

The Major Program

Lower Division Courses.—Required: French 1, 2, 3, 4, 5, and 6 or their equivalents; French 30A, 30B. Recommended: French 46A, 46B, and 46C; one year of college Latin or the equivalent.

Upper Division Courses.—Required: at least 36 units including 3 quarters of course 110, one of the following: 130, 131, 132, and a separate course in each of the following periods: sixteenth century, seventeenth century, eighteenth

121. The Russian Novel: Pushkin to Turgenev.
 123. The Russian Novel: Saltykov to Pasternak.
 128. Modern Russian Poets.
 140. Dostoevsky.
 141. Tolstoy.

Spanish

150. Masterpieces of Spanish Literature.

century, nineteenth century. Recommended: Classics 139A, 139B, 140.

Courses 107A, 107B, 160 and either course 104 or 105 are required for the General Secondary Teaching Credential in French.

Honors and Honors Program (see page 113). The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination.

Graduate Study.—The Department offers programs of study and research leading to the M.A. and Ph.D. degrees in French. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of French and Italian.

Teaching Minor.—A minimum of 30 units in French including courses 30A, 30B, 104, 105, and 107A–107B. Recommended: courses 46A, 46B, 46C.

Lower Division Courses

A course may not ordinarily be taken for credit if it is a prerequisite to a course already completed. Students offering high school language preparation as a prerequisite must take a placement test.

1. Elementary French. (4) I, II, III.

Discussion—5 hours.

The Staff

***1G. French for Graduate Students. No Credit. III.**

Recitation—3 hours. A course designed to prepare students for the graduate reading examination.

Mr. Herman

***1R. Elementary French—Reading. (4) I.**

Lecture—3 hours; laboratory—1 hour. Elementary French with emphasis on reading.

The Staff

* Not to be given, 1968–69.

2. Elementary French. (4) I, II, III.

Discussion—5 hours. Prerequisite: course 1 or equivalent. A continuation of course 1.

The Staff

***2R. Elementary French—Reading. (4) II.**

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 1R or equivalent. Elementary French with emphasis on reading. The Staff

3. Elementary French. (4) I, II, III.

Discussion—5 hours. Prerequisite: course 2 or equivalent. A continuation of course 2. The Staff

***3R. Elementary French—Reading. (4) III.**

Lecture—3 hours; laboratory—1 hour. Prerequisite: course 2R or equivalent. Elementary French with emphasis on reading. The Staff

4. Intermediate French. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 3 or equivalent.

The Staff

***4R. Intermediate French—Reading. (4) I.**

Laboratory—2 hours; recitation—3 hours. Prerequisite: course 3R or equivalent. This variant of course 4 places greater emphasis on reading than the regular course. The Staff

5. Intermediate French. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 4 or equivalent. Continuation of course 4. The Staff

***5R. Intermediate French—Reading. (4) II.**

Laboratory—2 hours; recitation—4 hours. Prerequisite: course 4R or equivalent. This variant of course 5 places greater emphasis on reading than the regular course. The Staff

6. Reading and Conversation. (4) I, II, III.

Recitation—3 hours. Prerequisite: course 5 or equivalent. Class discussion; reading of selected works; oral reports; analysis of texts. The Staff

30A. Grammar, Composition, and Conversation.

(3) I, II, III.

Lecture—3 hours. Prerequisite: course 6.

The Staff

30B. Grammar, Composition, and Conversation.

(3) I, II, III.

Lecture—3 hours. Prerequisite: course 30A.

The Staff

30C. Grammar, Composition, and Conversation.

(3) I, II, III.

Lecture—3 hours. Prerequisite: course 30B.

The Staff

46A. Survey of French Literature: Middle Ages and Renaissance. (3) I.

Lecture—3 hours. Prerequisite: course 6. Readings from major works; discussion of literary history and theory.

Mr. Keith

46B. Survey of French Literature from 1600 to 1800. (3) II.

Lecture—3 hours. Prerequisite: course 6. Readings from major works; discussion of literary history and theory.

Mr. Bloomberg

***46C. Survey of French Literature from 1800 to the Present. (3) III.**

Lecture—3 hours. Prerequisite: course 6. Readings from major works; discussion of literary history and criticism.

Miss Zantz

Upper Division Courses**104. Advanced Grammar and Composition. (3) I.**

Lecture—3 hours. Prerequisite: course 30C.

Mr. Bach

105. Advanced Grammar and Composition. (3) II.

Lecture—3 hours. Prerequisite: course 104.

Mr. Bach

107A-107B. Survey of French Culture and Institutions. (3-3) II-III.

Lecture—3 hours. Prerequisite: course 6. 107A—from the origins of French civilization through the Renaissance. 107B—from the seventeenth century to the present.

Mr. Calvin

110. Advanced Composition and Translation.

(2) III.

Lecture—2 hours. Prerequisite: course 30C. This course may be repeated for credit.

The Staff

115A. Medieval Literature: Epic and Romance.

(4) II.

Lecture—3 hours. Prerequisite: course 6. *La Chanson de Roland*, *Tristan et Iseut*, and selected works of Chrétien de Troyes.

Mr. Herman

***115B. Medieval Literature: Poetry, Drama and Satire. (4) II.**

Lecture—3 hours. Prerequisite: course 6. "Chansonniers" *Roman de la Rose*, *Fabliaux*, *Renart*, Villon.

Mr. Herman

116A. Literature of the Sixteenth Century. (4) III.

Lecture—3 hours. Prerequisite: course 6. A study of the lyric poetry of the sixteenth century, from Marot to d'Aubigné, with emphasis on the Pléiade.

Mr. Wilson

***116B. Literature of the Sixteenth Century. (4) II.**

Lecture—3 hours. Prerequisite: course 6. Rabelais and Montaigne. A critical study of the works in relationship to the period.

Mr. Wilson

117A. Theater of the Seventeenth Century. (4) I.

Lecture—3 hours. Prerequisite: course 6. Offered in even-numbered years.

Mr. Bloomberg

* Not to be given, 1968-69.

***117B. Novelists and Moralists of the Seventeenth Century. (4) II.**

Lecture—3 hours. Prerequisite: course 6.
Mr. Bloomberg

***117C. Classicism and Baroque. (4) III.**

Lecture—3 hours. Prerequisite: course 6.
Mr. Wilson

***118A. The Enlightenment. (4) I.**

Lecture—3 hours. Prerequisite: course 6.
Readings from Bayle, Fontenelle, Montesquieu,
Voltaire, Diderot, Rousseau, and others.

The Staff

118B. Drama and Novel in the Eighteenth Century. (4) I.

Lecture—3 hours. Prerequisite: course 6.
Plays of Marivaux and Beaumarchais; novels of
Lesage, Prevost, Diderot, Voltaire, Rousseau.
Miss Hytier

118C. Diderot and the Encyclopédie. (4) II.

Lecture—3 hours. Prerequisite: course 6.
Miss Hytier

119A. The Nineteenth Century. (4) III.

Lecture—3 hours. Prerequisite: course 6.
Romanticism in the drama and novel: Hugo,
Stendhal, Vigny, Musset, etc. Mr. Bach

***119B. The Nineteenth Century. (4) II.**

Lecture—3 hours. Prerequisite: course 6.
Realism: Balzac and Flaubert. Miss Zants

***119C. The Nineteenth Century. (4) III.**

Lecture—3 hours. Prerequisite: course 6.
Naturalism and Symbolism: Zola, Maupassant,
Mallarmé. The Staff

120A. Twentieth Century Drama. (4) II.

Lecture—3 hours. Prerequisite: course 6.
Representative plays from Jarry to Giraudoux.
Miss York

120B. Twentieth Century Drama. (4) III.

Lecture—3 hours. Prerequisite: course 6.
Representative plays from Anouilh to Ionesco.
Miss York

130. Critical Reading of Poetry. (4) III.

Lecture—3 hours. Prerequisite: course 6 or
its equivalent. Analysis and evaluation of works
representing main types of French poetry. Study
of poetic conventions and versification.
Mr. Lindsay

131. Critical Reading of Fiction. (4) II.

Lecture—3 hours. Prerequisite: course 6 or
its equivalent. Analysis and evaluation of short
stories and novels representing the main types
of French fiction, with emphasis on narrative
structure and techniques. Miss Zants

132. Critical Reading of Drama. (4) I.

Lecture—3 hours. Prerequisite: course 6 or
its equivalent. Analysis and evaluation of plays
representing main types of French drama, with
emphasis on dramatic structure and techniques.
Miss York

***138A. French Poetry from the Pre-Romantics to Baudelaire. (4) II.**

Lecture—3 hours. Prerequisite: course 6 or
equivalent. Offered in even-numbered years.
Mr. Hytier

***138B. French Poetry from Baudelaire to the Surrealists. (4) III.**

Lecture—3 hours. Prerequisite: course 6 or
equivalent. Offered in even-numbered years.
Mr. Hytier

14D. Study of a Major Writer. (4) I.

Lecture—3 hours. Prerequisite: course 6.
With the consent of the instructor, this course
may be repeated for credit.

Miss Hytier, Miss Zants

***141. Gide and Proust. (4) II.**

Lecture—3 hours. Prerequisite: course 6 for
those reading in French. Lectures and discussion
in English; reading in French or English.
Mr. Lindsay

***142. French Novel from Malraux to the Nouveau Roman. (4) III.**

Lecture—3 hours. Reading in French and
English. Mr. Lindsay

***145. Reading of Philosophical Texts. (4) II.**

Lecture—3 hours. Prerequisite: course 6.
Style and content of representative texts from
the Renaissance to the present. Mr. Lindsay

150. Masterpieces of French Literature. (4) I.

Lecture—3 hours. Prerequisite: English 1B.
Reading, lectures, and discussion in English.
May not be counted as part of the major in
French. Offered in even-numbered years.
Mr. Lindsay

***155. Criticism. (4) I.**

Lecture—3 hours. Prerequisite: course 6.
The study of various critical approaches to literature
(thematic, structural, linguistic, psychoanalytic,
etc.) together with their application to
selected French works. Mr. Wilson

160. Structure of the French Language. (4) II.

Lecture—3 hours. Prerequisite: course 6 or
consent of instructor. Linguistic analysis of modern
French. Mr. Keith

* Not to be given, 1968-69.

194H. Special Study for Honors Students.

(5) I, II, III.

Prerequisite: open only to honors students.
Guided research leading to an honors paper.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**200. Seminar in French Linguistics. (4) III.**

Seminar—3 hours. Prerequisite: graduate standing and consent of instructor. Study of substrata influences, dialect geography, homonymic conflict, jargons and argots, French contributions to linguistic theory. Mr. Keith

***201A. History of the French Language. (4) I.**

Seminar—3 hours.

Mr. Keith

***201B. History of the French Language. (4) II.**

Seminar—3 hours. Prerequisite: course 201A. Mr. Keith

202. Medieval French Literature. (4) III.

Seminar—3 hours. May be repeated for credit with consent of instructor. Mr. Hermann

Mr. Hermann

***203. Reading of Old French Texts. (4) III.**

Seminar—3 hours. Prerequisite: course 201A-201B or equivalent. Mr. Keith

Mr. Keith

***204. Sixteenth-Century French Literature. (4) III.**

Seminar—3 hours. May be repeated for credit with consent of the instructor. Mr. Wilson

Mr. Wilson

GENETICS—See also Animal Science**GENETICS**Robert W. Allard, Ph.D., *Chairman of the Department*

Department Office, 201 Hutchison Hall

Professors:Robert W. Allard, Ph.D. (*Genetics and Agronomy*)^{2, *}Melvin M. Green, Ph.D.¹G. Ledyard Stebbins, Ph.D.**Associate Professor:**

Sidney R. Snow, Ph.D.

Assistant Professors:

Harris Bernstein, Ph.D.

James B. Boyd, Ph.D.

^{*} Not to be given, 1968-69.¹ Absent on leave, 1968-69.² Absent on leave, fall quarter 1968.³ Absent on leave, winter quarter 1969.**206. Seventeenth-Century French Literature.**

(4) I, II, III.

Seminar—3 hours. May be repeated for credit with consent of the instructor. Mr. Hytier

208. Eighteenth-Century French Literature.

(4) I, II, III.

Seminar—3 hours. May be repeated for credit with consent of the instructor. Miss Hytier

215. Nineteenth-Century French Literature. (4) II.

Seminar—3 hours. May be repeated for credit with consent of the instructor. Mr. Hytier

220. Twentieth-Century French Literature.

(4) I, II, III.

Seminar—3 hours. May be repeated for credit with consent of the instructor. Mr. Hytier, Miss York, Miss Zants

***230. Old Provençal. (4) III.**

Seminar—3 hours. Prerequisite: course 201A, 201B or equivalent. An introduction to Old Provençal phonology and morphology, with reading and interpretation of texts. Mr. Keith

298. Group Study. (1-4) I, II, III.

Seminar—1-3 hours. May be repeated for credit with consent of the instructor. The Staff

299. Research. (2-5) I, II, III.

The Staff

Professional Course***300. The Teaching of a Modern Foreign Language. (3) III.**

Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language. The Staff

Paul E. Hansche, Ph.D. (*Genetics and Pomology*)Stephen L. Wolfe, Ph.D. (*Genetics and Zoology*)**Professors:**Harry H. Laidlaw, Jr., Ph.D. (*Entomology*)Philip M. Sheppard, Ph.D. (*Visiting*)**Lower Division Course****10. Heredity and Evolution. (3) II.**

Lecture—3 hours. The general principles of the laws of heredity and evolution for students not specializing in biology. No credit to students who have had or are taking upper division genetics courses. Mr. Sheppard

Upper Division Courses**100A. Principles of Genetics. (3) I, II.**

Lecture—3 hours; discussion—optional. Prerequisite: introductory course in zoology, botany or biology; upper division standing. Not open for credit to students who have received credit in course 115. Introduction to genetics with some consideration of its applications in agriculture and biology. I. Mr. Snow, II. Mr. Bernstein

100B. Principles of Genetics. (3) II, III.

Lecture—3 hours; discussion—optional. Prerequisite: course 100A. Continuation of course 100A. II. Mr. Allard, III. Mr. Hansche

100L. Principles of Genetics Laboratory. (1) II, III.

Laboratory—3 hours. Prerequisite: course 100A. Laboratory work in basic genetics to supplement course 100A, 100B, and 115.

Mr. Bernstein, Mr. Green

101. Cytogenetics. (3) I.

Lecture—3 hours. Prerequisite: course 100B or 115. Chromosome morphology and behavior as related to genetics and evolution.

Mr. Snow, Mr. Wolfe

101L. Cytogenetics Laboratory. (2) I.

Laboratory—3 hours. Prerequisite: course 101 (may be taken concurrently). Laboratory study of chromosome morphology and behavior.

Mr. Snow, Mr. Wolfe

102. Molecular and Biochemical Genetics. (3) I.

Lecture—3 hours. Prerequisite: course 100B, Biochemistry 101B. Study of gene structure, mutation and the biochemical basis of gene function. Offered in odd-numbered years.

Mr. Bernstein, Mr. Green

103. Organic Evolution. (3) III.

Lecture—3 hours. Prerequisite: course 100B or 115. Evolutionary processes in higher organisms. Mr. Sheppard

104. Developmental Genetics. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 100B or 115; Biochemistry 101B. The action of genes in development at the levels of the enzyme molecule, cellular organelle, tissue and organ, with examples from microorganisms, plants, and animals. Mr. Boyd

105. Population Genetics. (3) I.

Lecture—2 hours; discussion—1 hour; laboratory—1 hour. Prerequisite: course 100B or 115; recommended Mathematics 13, 16A. An introductory course in the analysis and interpretation of quantitative genetic systems.

Mr. Allard

115. Human Genetics. (5) III.

Lecture—4 hours; discussion—1 hour. Prerequisite: introductory course in zoology, botany, or biology; upper division standing. Recommended: Mathematics 13 or equivalent. Not

open for credit to students who have received credit in course 100. Introduction to genetics with special emphasis on man. This course will fulfill the needs of preprofessional students and those in other areas of human biology.

Mr. Green

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: Consent of instructor based on adequate preparation of the student in allied fields.

The Staff

Graduate Courses**205. Advanced Population Genetics. (3) II.**

Lecture—3 hours. Prerequisite: course 105, Mathematics 131A. Analysis of the genetic structure and evolution of populations.

Mr. Hansche

206. Current Topics in Genetics. (3) I, II, III.

Lecture—2 hours; laboratory or discussion—2 hours. Prerequisite: course 100B or 115, consent of the instructor. Selected topics of current interest in advanced genetics. May be repeated for credit.

291. Seminar in History of Genetics. (2) II.

Seminar—2 hours. Prerequisite: course 100B or 115. The development of modern genetic theories beginning with Mendel. Mr. Laidlaw

292. Seminar in Gene Structure and Action. (1-3) I.

Seminar—1 hour. Prerequisite: course 102 or 206; Bacteriology 170. Topics of current interest related to the structure of genes, mutation, and the mechanism of gene action. Offered in even-numbered years.

Mr. Bernstein

293. Seminar in Cytogenetics and Evolution.

(1-3) II.

Seminar—1-3 hours. Prerequisite: course 291 (may be taken concurrently). Topics of current interest related to chromosomal changes, mutation and other genetic changes in natural populations, and the application of genetics to study of organic evolution.

294. Seminar in Breeding Systems. (1-3) III.

Seminar—1-3 hours. Prerequisite: course 291. Topics of current interest relating genetics to problems of animal and plant breeding.

298. Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Directed group study of special topics in genetics.

The Staff

299. Research. (1-12) I, II, III.

The Staff

GEOGRAPHY

Kenneth Thompson, Ph.D., *Chairman of the Department*
Department Office, 328 Voorhies Hall

Associate Professors:

Howard F. Gregor, Ph.D.
Kenneth Thompson, Ph.D.

Assistant Professors:

Stephen C. Jett, Ph.D.
David R. Lee, Ph.D.
Paul D. Marr, Ph.D.
Roy J. Shlemon, Ph.D.



Lecturer:

Herbert B. Schultz, Ph.D. (*Agricultural Engineering*)

Departmental Major Advisers.—Mr. Marr,
Mr. Lee.

The Major Program

Lower Division Courses.—Required: Geography 1, 2, 3, 5; Anthropology 2.

Upper Division Courses.—Required: 36 upper division units in geography. Each program should normally include Geography 102 or 103, 105 and 151.

Students who wish to prepare for further training or employment in the field of Urban and Regional Planning may do so by completing certain additional courses, while fulfilling the requirements for the major, in consultation with the departmental adviser.

Teaching Major.—Requirements for the teaching major are the same as for the undergraduate major for degree, with the addition of Geography 300.

Teaching Minor.—A minimum of 30 quarter units in Geography, including course 300.

Subject Representative: Mr. Lee.

Graduate Study.—The department offers programs of graduate study leading to the M.A. and Ph.D. degrees. Information concerning these programs may be obtained from the Graduate Adviser, Department of Geography.

Lower Division Courses

1. Physical Geography. (4) I, III.

Lecture—4 hours. Basic physical elements of the human habitat, especially climate, landforms, soils, and natural vegetation.

Mr. Jett, Mr. Shlemon

2. Cultural Geography. (4) I, III.

Lecture—4 hours. Distribution and cultural differentiation of human groups. Population, technology, economy, and relation to habitat.

Mr. Jett

3. Climate and Weather. (3) II.

Lecture—3 hours. Composition and structure of atmosphere, weather elements, pressure, wind, temperature, moisture, fog, and clouds; weather maps; regional climates and world climate classification; instruments for obtaining climatological data; installation and maintenance of weather stations; evaluation of recordings.

Mr. Schultz

4. Introduction to Maps. (3) II.

Lecture—3 hours. History and principles of cartography; great map-makers; national surveys; modern trends in mapping.

Mr. Lee

5. Economic Geography. (4) I.

Lecture—3 hours; discussion—1 hour. Geographic aspects of the production, exchange, and consumption of goods.

Upper Division Courses

102. Field Course in Physical Geography. (4) III.

Lecture and Field trip—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.

Mr. Shlemon

103. Field Course in Human Geography. (4) I.

Lecture and Field trip—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 cultural landscape.

Mr. Lee

105. Cartography. (4) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 4; or consent of instructor. Theory and construction of map projections; interpretation of maps; compilation and generalization of base-map data; symbolization and processing of map data; cartographic designing and lettering techniques; map reproduction.

Mr. Lee

106. Interpretation of Aerial Photographs. (4) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 1; or consent of instructor. Analysis of landscape from aerial photographs: land forms; vegetation; land use; settlement; transport and communications. Preparation of contour and planimetric maps, and construction of aerial photo mosaics.

Mr. Marr

107. Advanced Cartography. (4) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 105 and 106. Advanced cartographic representation of field and aerial photographic data.

Mr. Lee

108. Analysis of Landforms. (4) II.

Lecture—3 hours. Prerequisite: course 1; or consent of instructor. Origin of land forms. Review of varied interpretations of processes involved, with emphasis on recent views.

Mr. Shlemon

119. Arid Lands. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; or consent of instructor. Physical characteristics and human utilization of rainfall deficiency regions.

Mr. Jett

121. North America. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2 or consent of instructor. Natural and economic regions of the United States and Canada.

Mr. Gregor

122A. Middle America. (4) II.

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.

122B. South America. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2; or consent of instructor. Environment, culture, and economy in the South American countries.

123A. Western Europe. (4) II.

Lecture—3 hours; discussion—1 hour. 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.

Mr. Thompson

***123B. Eastern Europe. (4) II.**

Lecture—3 hours; discussion—1 hour. 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 Eastern Europe.

124. The Soviet Union. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2; or consent of instructor. Physical landscapes and cultural regions of the U.S.S.R.

***125A. North Africa and the Near East. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2; or consent of instructor. Physical, cultural, and historical geography of the Arab World and its neighbors.

Mr. Lee

125B. Sub-Saharan Africa. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 1 and 2; or consent of instructor. Physical, cultural, and historical geography of Africa south of the Sahara.

Mr. Lee

* Not to be given, 1968-69.

131. California. (4) I, III.

Lecture—3 hours; discussion—1 hour. Regions of California: landforms, climate, and other physical characteristics; agricultural, mineral, and other resources; and patterns of settlement, population, transportation, and economy.

Mr. Shlemon, Mr. Gregor

141A. Economic Geography. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5; or consent of instructor. Factors in economic regionalism. Analysis of major agricultural regions of the earth.

Mr. Gregor

141B. Economic Geography. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 5; or consent of instructor. Factors in economic regionalism. Analysis of major industrial regions of the earth.

Mr. Gregor

143. Political Geography. (4) III.

Lecture—3 hours; discussion—1 hour. Areal differentiation of major natural and cultural phenomena affecting the world's political organization.

Mr. Thompson

151. History of Geographic Thought. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: three upper division courses in geography. The literature of geography: objectives, subdivisions, and development of the subject.

Mr. Thompson

152. Geographical Discovery and Exploration. (4) I.

Lecture—3 hours; discussion—1 hour. Expansion of western world's geographical horizons from ancient through modern times.

Mr. Thompson

155. Urban Geography. (4) I.

Lecture—3 hours; discussion—1 hour. Origin, development, distribution, and regional variation of the world's cities, with emphasis on an analysis of the functions and patterns of American cities.

Mr. Marr

156. Regional Structure. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1 or 2. Concepts of regional structure and their application to geographic problems; nodes, linkages, circulation, and regions. Quantitative and cartographic methods of regional research.

Mr. Marr

161. Conservation of Natural Resources. (4) III.

Lecture—3 hours; discussion—1 hour. Principles of the conservation of renewable and non-renewable resources: the conservation movement. Land-use conflicts between forestry, agricultural, mining, and recreational interests, especially in the United States.

Mr. Jett

162. Geography of Water Resources. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1; or consent of instructor.

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. Mr. Marr

170. Cultural Ecology. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2; or Anthropology 2. Theories of environment-man relations. Ecologic relations of gatherers, fishermen, hunters, swidden cultivators, peasants; their impact on environment; their domestic plants and animals.

199. Special Study for Advanced Undergraduates.

(2-4) I, II, III.

The Staff

Graduate Courses

250. Theory and Method in Geography. (4) III.

Lecture—2 hours; discussion—1 hour.

256. Regional Economic Organization. (4) III.

Seminar—3 hours. Analysis of theories of spatial organization and examination of their applicability to selected examples of regional economic development. Mr. Marr

GEOLOGY

¹James W. Valentine, Ph.D., *Acting Chairman of the Department*

Department Office, 306A Young Hall

Professors:

Daniel I. Axelrod, Ph.D.

²Cordell Durrell, Ph.D.

Charles G. Higgins, Ph.D.

Associate Professors:

Donald O. Emerson, Ph.D.

^{2,3}James W. Valentine, Ph.D.

Assistant Professors:

Richard Cowen, Ph.D.

Charles V. Guidotti, Ph.D.

Jere H. Lipps, Ph.D.

Eldridge M. Moores, Ph.D.

Thomas W. Todd, Ph.D.

Departmental Major Advisers.—B.S. Degree:

Mr. Todd, Mr. Moores, Mr. Cowen. A.B. Degree: Mr. Higgins.

The Major Programs

Students interested in becoming professional geologists and continuing their geological studies at the graduate level should elect the program

290. Seminar: Selected Regions. (4) III.

Seminar—3 hours. Region to be announced annually. Mr. Thompson

291. Seminar in Cultural Geography. (4) II.

Seminar—3 hours. Mr. Jett

292. Seminar in Physical Geography. (4) I.

Seminar—3 hours. Mr. Shlemon

293. Seminar in Economic Geography. (4) I.

Seminar—3 hours. Mr. Gregor

294. Seminar in Climatology. (4) II.

Seminar—3 hours. Mr. Schultz

295. Seminar in Urban Geography. (4) II.

Seminar—3 hours.

299. Research (2-9) I, II, III.

The Staff

Professional Course

300. Problems in Teaching Geography. (2) III.

Lecture—2 hours. Prerequisite: course 1 or 2. Establishing, organizing, and conducting courses in geography and regional study. Designed primarily for prospective elementary and secondary school teachers of the social sciences.

leading to the Bachelor of Science degree. Students desiring a less intensive program in geology as part of their general education or as preparation for nonprofessional careers in geology should elect the program leading to the Bachelor of Arts degree. High school students should note that the preparation for either degree is simplified if their high school programs include chemistry and four years of mathematics.

Bachelor of Science Major Program

Lower Division Courses.—Biology 1; Chemistry 1A-1B-1C or preferably 1A-7A-7B, Geology 1, 1L, 2, 2L, 3, 3L; Mathematics 1A-1B-1C; Physics 4A-4B. In addition, for emphasis in physical geology, Mathematics 2A and Physics 4C; for emphasis in paleobiology, Mathematics 15 and Zoology 2.

Upper Division Courses.—Geology 101A-101B-101C, 102A-102B, 105, 106, 107, 118, and 190 repeated twice. Additional courses in cognate sciences, mathematics, and geology, required for specialization within physical geology or paleobiology, must be selected on recommendation of the major adviser.

Bachelor of Arts Major Program

Lower Division Courses.—Biology 1; Chem-

¹Absent on leave, 1968-69.

²Absent on leave, fall quarter, 1968

³Absent on leave, winter quarter, 1969.

istry 1A-1B or 1A-7A; Geology 1, 1L, 2, 2L, 3, 3L; Physics 2A, 3A, 2B, 3B. Recommended: Chemistry 1C or 7B; Mathematics 13, 15, 16A; Physics 2C, 3C; Zoology 2.

Upper Division Courses.—Geology 101A-101B-101C, 102A, 105, 106, 107, and other upper division courses in geology and related fields to total not less than 36 units selected in accordance with a plan approved by the major adviser.

Honors and Honors Program (see page 113).—The honors program in geology consists of course 194H and an honors thesis incorporating studies undertaken in course 194H.

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.

Teaching Major.—Requirements for the teaching major are the same as for undergraduate major for degree (B.A. or B.S.).

Teaching Minor.—Thirty units (quarter units) to be selected with the advice of the subject representative. Eighteen of the 30 units must be at the upper division or graduate level.

Subject Representative: Mr. Todd

Lower Division Courses

1. General Geology. (3) I.

Lecture—3 hours. Recommended: high school chemistry, course 1L (may be taken concurrently). Physical geology: rocks, minerals, geologic structures, and internal constitution and processes of the Earth.

1L. General Geology Laboratory. (1) I.

Laboratory—3 hours. Prerequisite: course 1 (preferably taken concurrently). Study of important minerals and rocks; introduction to geologic maps.

Mr. Higgins

2. General Geology. (3) II.

Lecture—3 hours. Prerequisite: course 1. Recommended: course 2L taken concurrently. Physical geology and geomorphology: the Earth as a planet; processes which affect its erosional and depositional landforms.

Mr. Higgins

2L. General Geology Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: courses 1, 2 (preferably taken concurrently); stereoscopic vision recommended. Introduction to landforms and geologic features as depicted on topographic and geologic maps, structure sections, and aerial photographs.

Mr. Higgins

3. General Geology. (3) III.

Lecture—3 hours. Prerequisite: course 1. Recommended: course 3L taken concurrently. Historical geology: paleobiology, the fossil rec-

ord, and stratigraphy; an introduction to earth history.

3L. General Geology Laboratory. (1) III.

Laboratory—3 hours. Prerequisite: courses 1, 3 (preferably taken concurrently). Study of important fossils; problems in paleobiology and stratigraphy.

Upper Division Courses

101A-101B-101C. Mineralogy-Petrology.

(5-5-5) I-II-III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 1, 1L; Chemistry 1A (may be taken concurrently). Integrated sequence comprising fundamentals of physical and optical mineralogy, crystallography, crystal chemistry, petrography, and petrology.

The Staff

102A. Field Geology. (3) I.

Field—eight 9-hour days; orientation-discussion—eight 1-hour sessions; 10-hours report preparation. Prerequisite: courses 101C, 105 (may be taken concurrently). Recommended courses 2L, 151. Introduction to geologic field study.

The Staff

102B. Field Geology. (3) III.

Field—eight 9-hour days; discussion—eight 1-hour sessions; 10-hours report preparation. Prerequisite: courses 102A, 106. Recommended: course 152A. Continuation of course 102A.

The Staff

105. Structural Geology. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 1, 1L, 101A (may be taken concurrently); Physics 4A; course 102A taken concurrently recommended. Behavior of deformed rocks in the laboratory and the field; tectonic features and processes of the earth. Graphic solutions to structural problems; analysis of deformed areas. Formerly Geology 116.

106. Stratigraphy. (4) II.

Lecture—4 hours. Prerequisite: courses 2, 2L, 3, 3L. Lithologic and biologic aspects of stratified rocks and their interrelationships. Introduction to synthesis of Earth history. Formerly Geology 112.

Mr. Todd

107. Paleobiology. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: courses 1, 1L, 3, 3L; Biology 1. The origin, history, and morphology of the major phyla; principles and methods of interpreting ancient biotic systems. Formerly Geology 113 and 115.

Mr. Cowen

111A. Paleobiology of Invertebrates. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Morphology, systematics, evolution, and ecology of the major phyla of invertebrates.

Mr. Cowen

111B. Paleobiology of Protista. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 107. Morphology, systematics, evolution, and ecology of single-celled organisms.

Mr. Lipps

118. Summer Field Geology. (8) (Summer).

Six weeks in field. Prerequisite: course 102B. Preparation of a geologic map and report on a selected field area.

Mr. Moores

124. Advanced Mineralogy. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 101C. Consideration of special topics in mineralogy by means of optical and x-ray diffraction studies. Offered in odd-numbered years.

Mr. Guidotti

***125. Advanced Petrology. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 101C. Paragenesis of mineral assemblages as controlled by pressure, temperature, and composition. Laboratory study of selected petrologic problems. Offered in even-numbered years.

Mr. Guidotti

126. Sedimentation. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 101C. Characteristics of sedimentary materials; principles of sediment transport and deposition. Laboratory analyses of sediment texture and composition. (Formerly course 109C.)

Mr. Todd

140. Paleobotany. (4) III.

Lecture—2 hours; laboratory—3 hours. Analysis of the origins and migrational history of modern vegetation; floristic evolution and paleoclimate; paleoecologic analysis of Cenozoic floras.

Mr. Axelrod

151. Topographic Maps. (1) I.

Lecture—1 hour. Recommended: course 2L, Geography 4. Introduction to contour-relief maps; problems in location, construction of profiles, and general map-reading.

Mr. Higgins

152A. Aerial Photographs and Photogrammetry.

(1) II.

Lecture—1 hour. Prerequisite: stereoscopic vision; course 2L recommended. Types and availability of aerial photographs; stereoscopic viewing; geometry of the single vertical photograph and of the stereoscopic model; planimetric plotting, data-transfer, and quantitative measurements from photographs.

Mr. Higgins

152B. Photogeology. (3) III.

Lecture—1 hour; laboratory-workshop—6 hours. Prerequisite: stereoscopic vision; courses 1 and 2 (or Geography 1) and course 152A (or Geography 106); courses 2L, 102A, 105 recommended. Group-learning experience in interpre-

tation of geologic structures, rock types, and regional geologic history by analysis of landforms, drainage, vegetation and outcrop patterns, tone, texture, and other elements visible on aerial photographs. Workshop sections limited to 12 students.

Mr. Higgins

153. Studies in Geomorphology. (3) I.

Lecture—3 hours. Prerequisite: course 2. Recommended: course 2L; Geography 108. Methods of analysis of geomorphic problems. Offered in even-numbered years.

Mr. Higgins

190. Seminar in Geology. (1) I, II, III.

Seminar—1 hour; discussion 1 hour. Prerequisite: senior standing in geology. Presentation and discussion of current topics in geology by visiting lecturers, staff, and students. May be repeated for credit.

The Staff

194H. Special Study for Honor Students. (3) I, II, III.

Prerequisite: open only to majors of senior standing who qualify for the honors program. Independent study of selected topics under direction of the staff. Completion will involve the writing of an honors thesis.

The Staff

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: senior standing in geology.

The Staff

199. Special Study for Advanced Undergraduates.

(1-4) I, II, III.

The Staff

Graduate Courses***213. Geomorphology. (3) I.**

Seminar—two 1½ hour sessions per week. Prerequisite: course 153 or Geography 108. Selected geomorphic studies of superficial processes and the evolution of landforms. Offered in odd-numbered years.

Mr. Higgins

216. Tectonics. (3) II.

Seminar—3 hours. Prerequisite: course 105. Tectonic features of the Earth; structural histories of selected deformed belts in relation to theories of orogenesis. Offered in odd-numbered years.

Mr. Moores

***218. Advanced Structural Analysis. (3) II.**

Lecture—2 hours; seminar—1 hour. Prerequisite: course 105. Analysis of stress and strain. Theoretical and experimental investigations of rock deformation. Principles of fracture, folding, and flow of rocks and their application to field occurrences. Offered in even-numbered years.

Mr. Moores

+236. Physical Geology of California. (2) I, II, III.

Seminar—2 hours.

Mr. Durrell

* Not to be given, 1968-69.

† Not to be given, fall quarter 1968.

254. Phase Equilibria. (3) II.

Seminar—3 hours. Prerequisite: Chemistry 1C; Mathematics 2A; physical chemistry recommended. Physicochemical aspects of the phase relations in silicate systems and their application to the petrogenesis of igneous and metamorphic rocks. Offered in odd-numbered years.

Mr. Guidotti

***255. Genesis of Metamorphic Rocks. (3) II.**

Seminar—3 hours. Prerequisite: course 101C; courses 125, 254 recommended. Physicochemical principles of metamorphic mineral assemblages and methods of interpreting the paragenesis of metamorphic rocks. Offered in even-numbered years.

Mr. Guidotti

***257. Sedimentary Petrology: Terrigenous Rocks.**

(4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 126. Origin of land-derived non-carbonate clastic rocks. Tetral and compositional analyses in thin section. Formerly Geology 257A. Offered in even-numbered years.

Mr. Todd

258. Sedimentary Petrology: Carbonate Rocks.

(4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 126. Origin of biological, biochemical, and chemical sedimentary carbonate rocks. Textural and compositional analyses in thin section. Formerly Geology 257B. Offered in odd-numbered years.

Mr. Todd

260. Paleontology. (3) III.

Seminar—3 hours. Prerequisite: courses 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.

Messrs. Axelrod, Cowen, Lipps, Valentine

***261. Paleoenology. (3) I.**

Lecture—2 hours; seminar—1 hour. Prerequisite: course 107; Mathematics 15; Mathematics 13 recommended. Theoretical and operational analyses of the structure and evolution of ancient and modern biotic associations, chiefly marine. Offered in odd-numbered years.

Mr. Valentine

262. Paleosystematics. (3) I.

Lecture—1 hour; seminar—2 hours. Prerequisite: course 107; Mathematics 15; Genetics 100B, Mathematics 13 recommended. Principles and methods of taxonomy of fossil organisms. Offered in even-numbered years. Mr. Lips

263. Functional Morphology of Fossil Invertebrates. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 111A. Principles and methods of functional analysis of fossils, with special reference to selected problems in invertebrate phyla.

Mr. Cowen

280. Igneous Petrology. (3) I.

Seminar—2 hours; laboratory—3 hours. Prerequisite: course 101C. Integrated laboratory, field study, and seminar on igneous processes and products.

Mr. Emerson

290. Seminar in Geology. (1) I, II, III.

Seminar—1 hour; discussion—1 hour. Presentation and discussion of current topics geology by visiting lecturers, staff, and students.

The Staff

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-6) I, II, III.

The Staff

GERMAN

Clifford A. Bernd, Ph.D., *Chairman of the Department*

Department Office, 416 Sproul Hall

Associate Professors:

Clifford A. Bernd, Ph.D.
Roland W. Hoermann, Ph.D.
H. Guenther Nerjes, Ph.D.

Assistant Professors:

Wolfgang Bender, Ph.D.
William M. Estabrook, Ph.D.
John F. Fetzer, Ph.D.
A. Cornelius Sommer, Ph.D.

◇ ◇ ◇

Associate Professor:

Rolf C. Zimmermann, Ph.D. (*Visiting*)

Lecturer:

Anthony S. Kawczynski, M.A.

Associates:

Dietmar Jokiel, M.A.
Roger Kampfschulte, M.A.
William McNabb, M.A.
Rolf Dieter Mauch, M.A.
Margit Nance, M.A.
Marie-Luise Wenderoth, B.A.

* Not to be given, 1968-69.

Departmental Major Adviser.—Mr. Estabrook.

Graduate Advisers.—Mr. Nerjes, Mr. Fetzer.

The Major Program

Lower Division Courses.—German 1, 2, 3, 4, 5, 7, or 6A and 6B, or their equivalents.

Upper Division Courses.—36 units in upper division courses, including German 101, 102, 103; 119 recommended.

Honors and Honors Program (see page 113).

—The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination.

The Master of Arts Degree

The Department offers programs of study leading to the M.A. degree. A minimum of 36 units is required. In addition, candidates for the M.A. will be expected to acquire a reading knowledge of French. Further information may be obtained by writing to 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 Graduate Adviser.

Teaching Major.—Requirements are the same as for the departmental major.

Teaching Minor.—A minimum of 30 units in German, including 101, 102, 103.

Subject Representative: Mr. Estabrook.

Lower Division Courses

1. Elementary German. (4) I, II, III.

Lecture—1 hour; discussion—3 hours; supplementary laboratory practice. Mr. Estabrook

1G. German for Graduate Students. No Credit. I.

Lecture—3 hours. A course designed to prepare students for the graduate reading examination.
Mr. Kawczynski

2. Elementary German. (4) I, II, III.

Lecture—1 hour; discussion—3 hours; supplementary laboratory practice. Prerequisite: course 1 or equivalent. Continuation of course 1.
Mr. Estabrook

3. Elementary German. (4) I, II, III.

Lecture—1 hour; discussion—3 hours; supplementary laboratory practice. Prerequisite: course 2 or equivalent. Continuation of course 2.
Mr. Estabrook

4. Intermediate German. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 3. Spoken German stressed; class discussion of modern short stories, with inductive review of grammar.
The Staff

4R. Intermediate German Reading. (3) I.

Lecture—3 hours. Prerequisite: course 3. Intensive emphasis on reading and translation of materials taken primarily from the natural sciences. A continuation of course 3. The Staff

5. Intermediate German. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 4. Spoken German stressed through class discussion of a variety of selected readings. A continuation of course 4.
The Staff

5R. Intermediate German—Reading. (3) II.

Lecture—3 hours. Prerequisite: course 4R. A continuation of course 4R.
The Staff

6A. Spoken German. (2) I, II, III.

Discussion—2 hours. Prerequisite: course 5. May be taken concurrently with 6B and/or 7. Intensive conversational practice based on the everyday vocabulary of reading assignments in German newspapers and contemporary literature.
Miss Wenderoth

6B. Spoken German. (2) I, II, III.

Discussion—2 hours. Prerequisite: course 5. May be taken concurrently with 6A and/or 7. Intensive conversational practice and discussions based on selected literary texts; oral interpretation of dramatic roles in representative dramas and one-act plays.
Miss Wenderoth

7. Advanced German. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 5. May be taken concurrently with 6A and/or 6B. Review of grammatical and stylistic principles by means of written exercises; expanding of comprehension vocabulary through rapid and extensive readings of modern prose, dramatic and verse texts.
The Staff

49. Freshman Seminar. (2) II.

Discussion—2 hours. Prerequisite: Knowledge of German not required. Inquiry into the intellectual roots of problems confronting today's students, particularly as illustrated in translation, by such modern German literary figures as Nietzsche, Kafka, Hesse, Brecht, and Günter Grass. Enrollment limited to 15 freshmen.
Mr. Hoermann

Upper Division Courses

101. Composition and Conversation. (4) I, II, III.

Lecture—3 hours. Prerequisite: course 7 or courses 6A and 6B, or their equivalents.
The Staff

102. Composition and Conversation. (4) I, II, III.

Lecture—3 hours. Prerequisite: course 101 or consent of instructor. Intermediate essay-writing; analysis of literary and journalistic styles; extension of active writing and speaking vocabulary.
The Staff

103. Advanced Composition. (4) I, II, III.

Lecture—3 hours. Prerequisite: course 102 or consent of instructor. Advanced prose style and original composition. The Staff

104. German Grammar and Stylistics. (4) I.

Lecture—3 hours. Prerequisite: course 103 or consent of instructor. The grammar and stylistics of modern written usage. Mr. Bender

105. History of the German Language. (4) II.

Lecture—3 hours. Prerequisite: course 102. Survey of the linguistic development from the Germanic and Old High German sound shifts; Middle High diptongization and monophthongization; Ablaut and Umlaut phenomena; "Kanzleisprache" and Luther; origins of modern comparative philology with the Grimms; elementary phonetics. Offered in odd-numbered years.

Mr. Estabrook

106. Linguistic Structure of German (4) I.

Lecture—3 hours. A linguistic analysis of modern standard German including phonetics, phonemics, morphology and Syntax. Offered in even-numbered years. Mr. Estabrook

108. Contrastive Structures of English and German. (4) II.

Lecture—3 hours; other—1 hour. Prerequisite: course 106. A contrastive study of the linguistic structures of English and German. Offered in even-numbered years. Mr. Estabrook

109. Development of German Culture. (4) III.

Lecture—3 hours. Prerequisite: course 7 or courses 6A and 6B, or their equivalents. The evolution of ideas, science, and the arts as dimensions of German society and national thought. Mr. Fetzer

110. Masterpieces of German Prose from Goethe to Kafka. (4) I.

Lecture—3 hours. Study in translation of works which have helped shape the European tradition in the novel and short story or were crucial in the development of German literature. Knowledge of German not required; may not be counted as part of the major in German. Offered in even-numbered years. Mr. Hoermann

111. Masterpieces of German Drama from Lessing to Brecht. (4) III.

Lecture—3 hours. Study in translation of works which have helped shape the European drama or were crucial in the development of German literature. Knowledge of German not required; may not be counted as part of the major in German. Offered in odd-numbered years. Mr. Hoermann

112. Masterpieces of German Poetry from Walther von der Vogelweide to Rilke. (4) III.

Lecture—3 hours. Study in translation of the German Lyric genius from medieval love poetry through the classicism of Goethe and Hölderlin to the mysticism of Rilke. Knowledge of German not required; may not be counted as part of the major in German. Offered in odd-numbered years. Mr. Hoermann

114. Goethe's Faust. (4) II.

Lecture—3 hours. A detailed analysis and aesthetic critique in English of both "Parts," together with the first-draft *Urfaust*. Knowledge of German not required; German majors fulfill readings in German. Offered in even-numbered years. Mr. Nerjes

115. German Literature of the Twentieth Century Up to the Second World War. (4) I.

Lecture—3 hours. Knowledge of German not required. The sublimation of tradition and the exploration of new forms from Nietzsche's death until the Second World War, including readings in translation from Hofmannsthal, Hesse, Rilke, Kafka, and Thomas Mann. Knowledge of German not required. Mr. Hoermann

116. German Literature of the Twentieth Century Since the Second World War. (4) II.

Lecture—3 hours. Knowledge of German not required. The period of reawakening since 1945, the search for identity and meaning within the European community East and West, and the German political-moral dilemma as reflected in translated works by Brecht, Frisch, Dürrenmatt, Grass, and other "Gruppe 47" writers. Mr. Hoermann

119A. Survey of Literary Periods Through Classicism. (4) I.

Prerequisite: course 7 or courses 6A and 6B, or their equivalents. An integrated view of the philosophical, historical, and stylistic components in the development of the German literary tradition up to German Romanticism. Mr. Nerjes

119B. Survey of Literary Periods from Romanticism to the Present. (4) II.

Lecture—3 hours. Prerequisite: course 119A. Romanticism to the present. Continuation of course 119A. Mr. Nerjes

120. The Medieval Period in German Literature. (4) III.

Lecture—3 hours. Prerequisite: courses 7 or 6A and 6B, or their equivalents. The literary-philosophical profile of the "Mittelhochdeutsche Blütezeit" in terms of the significant courtly and folk epics and the "Minnesang." Readings in modern German translation. Offered in odd-numbered years. Mr. Fetzer

121. The Renaissance and Reformation Period in German Literature. (4) II.

Lecture—3 hours. Prerequisite: course 7 or 6A and 6B, or their equivalents. The distinctive thought and literary values of the period from *Der Ackermann aus Böhmen* through the "Meistersgesang" and "Fastnachtspiel" of Hans Sachs. Offered in even-numbered years. Mr. Bender

122. The Baroque Period. (4) II.

Lecture—3 hours. Prerequisite: course 7 or 6A and 6B, or their equivalents. The stylistic and philosophical predicament of the Thirty-Years War era as documented in the works of Opitz and the Silesian Schools to Grimmelshausen and Gryphius. Offered in odd-numbered years.

Mr. Bender

123. Enlightenment, Sentimentality and Rococo in German Literature. (4) I.

Lecture—3 hours. Prerequisite: course 7 or courses 6A and 6B, or their equivalents. From the rationalism of Gottsched to the humanism of Lessing, from the hymodic verse of Klopstock, the anacreontic of Gellert, the rococo of Wieland to the beginnings of "Sturm und Drang" with Herder.

Mr. Sommer

125A. Goethe. (4) I.

Lecture—3 hours. Prerequisite: course 7 or courses 6A and 6B, or their equivalents. Goethe's development from his anacreontic period to the Italian Journey, with particular emphasis on *Werther*, *Götz* and his early lyrics.

Mr. Zimmermann

125B. Goethe. (4) II.

Lecture—3 hours. Prerequisite: course 7 or courses 6A and 6B, or their equivalents. From the Italian Journey to his death. Study and discussion of the master works of his later period.

Mr. Zimmermann

126A. Young Schiller. (4) II.

Lecture—3 hours. Prerequisite: course 7 or courses 6A and 6B, or their equivalents. A study of the poetry and dramas of his "Sturm und Drang" period to the beginning of the classical era: from *Die Räuber* to *Don Carlos*. Mr. Nierjes

126B. Classical Schiller. (4) III.

Lecture—3 hours. Prerequisite: course 7 or courses 6A and 6B, or their equivalents. Schiller's historical dramas in conjunction with his critical essays and "Ideenidichtung." Mr. Nierjes

127. Romanticism. (4) III.

Lecture—3 hours. Prerequisite: course 7 or courses 6A and 6B, or their equivalents. The Napoleonic era from the Jena school of the Schlegels, and Novalis, through the Arnim-Brentano group in Heidelberg, to the Berlin circle including Tieck, Eichendorff, and Hoffmann.

Mr. Fetzer

128. Early Nineteenth-Century German Realism. (4) II.

Lecture—3 hours. Prerequisite: course 7 or courses 6A and 6B, or their equivalents. An examination of the work of such important literary figures as Kleist, Hebbel, Büchner, and Grillparzer.

Mr. Bernd

129. Naturalism to Neo-Classicism in German. (4) II.

Lecture—3 hours. Prerequisite: course 7 or courses 6A and 6B, or their equivalents. From Hauptmann and the social protest of north-German naturalism, through the Viennese psychological impressionism of Schnitzler and the neo-romanticism of Hofmannsthal and Hesse, to Rilke and the collective mysticism of the "George-Kreis." Offered in even-numbered years.

Mr. Fetzer

130. The Modern Period from Expressionism to the Present. (4) I.

Lecture—3 hours. Prerequisite: course 7 or courses 6A and 6B, or their equivalents. The moral and existential quandary from Nietzsche, Wedekind, and the wartime generation of dramatists, through the poetry of Trakl, Loerke, and Benn; novelistic mastery in Thomas Mann and Kafka, and the new theater of Brecht, Frisch, and Dürrenmatt. Offered in odd-numbered years.

Mr. Fetzer

132. The German Novelle. (4) II.

Lecture—3 hours. Prerequisite: course 7 or courses 6A and 6B, or their equivalents. An inquiry into the art of the "Novelle" through analysis of the materials and formal devices of representative authors from Goethe to Kafka.

Mr. Bernd

134. German Poetry. (4) III.

Lecture—3 hours. Prerequisite: course 7 or courses 6A and 6B, or their equivalents. Analysis and study of representative lyric modes as deduced from the master specimens of verse throughout German literature. Offered in odd-numbered years.

Mr. Hoermann

190. Proseminar in a Major Writer. (4) II, III.

Lecture—3 hours. Prerequisite: course 7 or courses 6A and 6B, or their equivalents. Introduction to techniques of independent research and seminar reporting and rebuttal. May be repeated for credit with consent of the instructor.

Mr. Bender

194H. Special Study for Honors Students.

(5) I, II, III.

Prerequisite: open only to honors students. Guided research leading to an honors paper.

The Staff

198. Directed Group Study. (1-5) I, II, III. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**200. Gothic. (4) I.**

Seminar—3 hours. Phonology, grammar and reading of Gothic texts. Special topics including the relationship of Gothic to Indo-European and to the other Germanic languages. Knowledge of Modern German not required. Offered in even-numbered years. Mr. Estabrook

201. Old High German. (4) II.

Seminar—3 hours. A study of the beginnings of German as a written language through the reading of selected texts from the eighth through the eleventh centuries. A linguistic analysis of the dialects. Offered in even-numbered years. Mr. Estabrook

202. Middle High German. (4) III.

Seminar—3 hours. Outline of grammar; selections from Middle High German epic and lyric poetry. Offered in odd-numbered years. Mr. Estabrook

203. Old Saxon. (4) III.

Seminar—3 hours. A study of the linguistic structure and the literary significance of the language of the Old Saxon *Heliand*. Knowledge of Modern German not required. Offered in even-numbered years. Mr. Estabrook

210. Techniques of Literary Scholarship. (4) I.

Seminar—3 hours. The bibliographic, organizational, and methodological tools and resources for advanced, independent research. Mr. Sommer

211. The Rise of German Literary Criticism. (4) I.

Seminar—3 hours. The history of criticism in Germany, with some attention to classical sources. The course proceeds chronologically until the modern period, then by a study of special topics broadens to a consideration of recent approaches to German literature. Mr. Bernd

240. Forms of German Verse. (4) II.

Seminar—3 hours. The development of German verse from the Middle Ages to Gottfried Benn, with special emphasis on different techniques of text analysis and interpretation. Offered in even-numbered years. May be repeated for credit with consent of the instructor. Mr. Sommer

241. The German Drama. (4) III.

Seminar—3 hours. The major forms of German drama from the origins to the middle of the twentieth century. Offered in even-numbered years. May be repeated for credit with the consent of the instructor. Mr. Fetzer

242. The German "Novelle." (4) II.

Seminar—3 hours. The major German *Novelisten*, with particular emphasis on the flowering of this genre in the nineteenth century. Offered in odd-numbered years. May be repeated for credit with consent of the instructor. Mr. Bernd

250. Walther von der Vogelweide and the "Minnesang." (4) II.

Seminar—3 hours. Offered in even-numbered years. Mr. Estabrook

251. Studies in the Works of Andreas Gryphius. (4) II.

Seminar—3 hours. A study of Gryphius' literary legacy, his lyrics, his tragedies and his comedies, with the purpose of showing his place in the world of seventeenth-century thought, artistic, religious and humanistic. Offered in even-numbered years. Mr. Bender

252. The Writings of Lessing. (4) I.

Seminar—3 hours. A study of Lessing's theory of literature with particular emphasis upon his critical attacks on French drama. Offered in odd-numbered years. Mr. Bender

253. Goethe. (4) III.

Seminar—3 hours. A study of the origins of Goethe's thought in German Pietism, and his principal artistic, autobiographical, scientific and philosophical works. Offered in even-numbered years. Mr. Zimmermann

254. Schiller. (4) II.

Seminar—3 hours. A critical analysis of Schiller's major works and his impact on the intellectual climate in Germany during the late eighteenth and early nineteenth centuries. Offered in odd-numbered years. Mr. Nierjes

257. Heinrich von Kleist. (4) III.

Seminar—3 hours. Kleist's important dramatic and prosaic works; special attention will be given to the peculiar hermeneutic problems in modern German, French and Anglo-American Kleist criticism. Offered in even-numbered years. Mr. Bernd

258. The Novels of Thomas Mann. (4) II.

Seminar—3 hours. Reading of selected novels with emphasis on aesthetic techniques, originality, ethical and political views, and influence on the contemporary literary scene in Germany. Offered in odd-numbered years. Mr. Fetzer

259. Studies in Kafka. (4) I.

Seminar—3 hours. Study of Kafka's nuclear fables. Offered in odd-numbered years. Mr. Fetzer

260. The Poetry of Rilke. (4) I.

Seminar—3 hours. A study of the principal motifs, myths, images and problems in the poetry of Rainer Maria Rilke. Offered in even-numbered years.

Mr. Hoermann

261. Brecht and the Epic Theater. (4) III.

Seminar—3 hours. A reading of all works with emphasis on the ideas which impelled the development of new literary forms and concepts. Offered in odd-numbered years.

Mr. Hoermann

285. Middle High German Literature. (4) II.

Seminar—3 hours. An extensive reading of Middle High German texts with emphasis upon balletristic and cultural values; also examines linguistic problems. Offered in even-numbered years. May be repeated for credit with consent of the instructor.

Mr. Estabrook

288. The Renaissance and Reformation in**German Literature. (4) I.**

Seminar—3 hours. The parabolic and didactic style in Germany's literature during the sixteenth century. Offered in odd-numbered years. May be repeated for credit with consent of the instructor.

Mr. Bender

289. German Literature of the Baroque. (4) I.

Seminar—3 hours. The "Elegantiaideal" and the varying methods used to portray it in seventeenth-century German literature. Offered in even-numbered years. May be repeated for credit with consent of the instructor. Mr. Bender

290. The Enlightenment in German Literature.**(4) III.**

Seminar—3 hours. The revolt against the excesses of the "Elegantiaideal," and the evolution of a new literature based on reason and wit. Offered in even-numbered years. May be repeated for credit with consent of the instructor.

Mr. Sommer

291. Rococo in German Literature. (4) II.

Seminar—3 hours. The essential novels of Christoph Martin Wieland and those contemporaries of his whose literary style mirrors the euphony that is characteristic of Mozart's music. Offered in odd-numbered years. May be repeated for credit with consent of the instructor.

Mr. Nerjes

292. Sentimentality and "Sturm und Drang" in German Literature. (4) III.

Seminar—3 hours. The German liberal authors of the eighteenth century, such as Johann Georg Hamann and Johann Gottfried Herder, who lived in complete disagreement with the rationalistic tenets of their age. Offered in even-numbered years. May be repeated for credit with consent of the instructor. Mr. Zimmermann

293. The Classical Age of German Literature. (4) I.

Seminar—3 hours. An inquiry into the aesthetic and humanistic qualities of Germany's greatest literary epoch. Offered in even-numbered years. May be repeated for credit with the consent of the instructor.

Mr. Nerjes

294. The Romantic Period in German Literature.**(4) II.**

Seminar—3 hours. Survey of the works of early nineteenth-century authors in reaction against the age of classicism. Offered in even-numbered years. May be repeated for credit with consent of the instructor.

Mr. Fetzer

295. Poetic Realism in German Literature. (4) III.

Seminar—3 hours. Outstanding figures in German literature between 1840 and 1890. Important phases in their developments will be treated. Offered in odd-numbered years. May be repeated for credit with consent of the instructor.

Mr. Bernd

296. Twentieth Century German Literature. (4) III.

Seminar—3 hours. Considers the revolt of the Hauptmann generation, symbolism, expressionism, and the chief currents of the contemporary scene. Offered in even-numbered years. May be repeated for credit with consent of the instructor.

Mr. Hoermann

298. Group Study. (1-9) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

Professional Course**300. The Teaching of a Modern Foreign Language. (3) III.**

Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

Mr. Kawczynski

GREEK—See Classics**HEBREW—See Oriental Languages**

HISTORY

Walter L. Woodfill, Ph.D., *Chairman of the Department*
 Department Office, 167 Voorhies Hall

Professors:

William M. Bowsky, Ph.D.
 David Brody, Ph.D.
 W. Turrentine Jackson, Ph.D.
¹Kwang-Ching Liu, Ph.D.
 C. Bickford O'Brien, Ph.D.
¹Peter Paret, Ph.D.
 Rollie E. Poppino, Ph.D.
 James H. Shideler, Ph.D.
 F. Wilson Smith, Ph.D.
 F. Roy Willis, Ph.D.
 Walter L. Woodfill, Ph.D.

Associate Professors:

²Daniel Calhoun, Ph.D.
 Paul Goodman, Ph.D.
 David L. Jacobson, Ph.D.
 Jung-Pang Lo, Ph.D.
 Richard N. Schwab, Ph.D.
 Donald C. Swain, Ph.D.

Assistant Professors:

Arthur F. Corwin, Ph.D.
 Manfred P. Fleischer, Ph.D.
 C. Roland Marchand, Ph.D.
 Gordon R. Mork, Ph.D.
¹Morgan B. Sherwood, Ph.D.
 Stylianos Spyridakis, Ph.D.



Lecturers:

Peter R. Kolchin, B.A.
 Daniel M. Mulholland, B.A.

Departmental Advisers.—Mr. Corwin, Mr. Fleischer, Mr. Jacobson, Mr. Lo, Mr. Marchand, Mr. Poppino, Mr. Schwab, Mr. Swain, Mr. Mork.

Graduate Advisers.—Mr. Bowsky, Mr. Brody, Mr. Shideler, Mr. Smith, Mr. Willis.

Introductory Courses.—Courses 4A, 4B, 4C, 17A, and 17B are open to all students.

The American History and Institutions requirement may be satisfied by any two of the following courses: History 17A, 17B, 170A, 170B, 170C, 171A, 171B, 171C, 174A, 174B, 175A, 175B, 176A, 176B, 178A, 178B, 179A, 179B, 180, 183A, 183B. See also page 34.

¹ Absent on leave, 1968-69.

² Absent on leave, fall quarter 1968.

The Major Program

Lower Division Courses.—Required: Courses 4A, 4B, 4C, 17A, 17B. It is recommended that students, in consultation with their advisers, also take at least 6 or 8 units (normally a two-quarter sequence of courses) in one of the following fields: cultural anthropology, cultural geography, principles of economics, English literature, literature of the United States, philosophy, political science, psychology, or sociology.

Upper Division Courses.—Required: Students majoring in history must complete at least 36 upper division units in history, including:

(a) A minimum of 12 units (including a two-quarter sequence of courses) in a field of concentration (for "field" see below).

(b) A minimum of 8 units each in two other fields of history. (The fields referred to are Great Britain, Europe, Russia, East Asia, Latin America, and the United States).

Honors and Honors Program (see page 113).—A student may become eligible for graduation with honors in history by enrolling in the department's honors program, and will be invited by the department to do so. This program comprises course 101A, normally taken during the junior year, and the writing of a research paper in History 101B, 199, or other approved course during the senior year. Before being admitted to the honors program, a student must complete 20 units of history, including both United States and European history (normally courses 4 and 17) with an average grade of B.

Graduate Study.—The Department of History offers programs of study and research leading to the M.A. and Ph.D. degrees in history. Detailed information may be obtained by writing to the Graduate Adviser, Department of History.

Teaching Major.—Requirements are the same as for the departmental major plus course 300.

Teaching Minor.—Thirty-two units of history, including 4A-4B-4C, 17A-17B, and 12 units of upper division course work. The 12 units of upper division work should include a two-quarter sequence.

Subject Representative: Mr. Jacobson

Lower Division Courses

4A. History of Western Civilization. (4) I.

Lecture—3 hours; discussion—1 hour. The growth of western civilization from ancient times through the middle ages. The Staff

4B. History of Western Civilization. (4) II.

Lecture—3 hours; discussion—1 hour. The development of western civilization from the Renaissance through 1815. The Staff

4C. History of Western Civilization. (4) III.

Lecture—3 hours; discussion—1 hour. The development of western civilization in the nineteenth and twentieth centuries. The Staff

17A. History of the United States. (4) I, II.

Lecture—3 hours; discussion—1 hour. The growth of the American people from colonial times through the Civil War. The Staff

17B. History of the United States. (4) II, III.

Lecture—3 hours; discussion—1 hour. The American people from Reconstruction to the present. The Staff

49. Freshman Seminar. (2) I, II, III.

Seminar—2 hours. Prerequisite: permission of instructor. Reports, discussion and elementary research in the several fields of history designed for the beginning student. The Staff

Upper Division Courses**101A. Introduction to Historical Thought and Writing. (4) III.**

Lecture—3 hours; discussion—1 hour. 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. Mr. Marchand

***101B. Introduction to Historical Methods. (4) I, II.**

Discussion—4 hours. Prerequisite: consent of instructor. The development of skills in historical research and composition through individual, guided research. An extensive paper is required. The Staff

102. Proseminar in History. (4) I, II, III.

Seminar—3 hours. Prerequisite: consent of instructor. Designed primarily for history majors. Intensive reading, discussion, and writing in selected topics in the various fields of history, in classes with limited enrollment. May be repeated for credit. (102A. Ancient; 102B. Medieval; 102C. Modern European; 102D. English; 102E. American; 102F. Latin American; 102G. East Asian; 102H. Russian.) The Staff

111A. Ancient History. (4) I.

Lecture—3 hours. History of the ancient empires of the Near East and of the Greek city-states to the fifth century B.C. Mr. Spyridakis

111B. Ancient History. (4) II.

Lecture—3 hours. History of Greece, the Hellenistic kingdoms, and Rome from the fifth century B.C. to the Punic Wars. Mr. Spyridakis

111C. Ancient History. (4) III.

Lecture—3 hours. History of Rome and its empire from the Punic Wars to Constantine. Mr. Spyridakis

***121A. Medieval History. (4) I.**

Lecture—3 hours. European history from Constantine to the eighth century. Mr. Bowsky

121B. Medieval History. (4) II.

Lecture—3 hours. European history from Charlemagne to the eleventh century. Mr. Bowsky

121C. Medieval History. (4) III.

Lecture—3 hours. European history from the Crusades to the Renaissance. Mr. Bowsky

131A. Early Modern European History. (4) I.

Lecture—3 hours. Recommended: courses 4A, 4B. Western European history from about 1350 to about 1500. Mr. Fleischer

131B. Early Modern European History. (4) II.

Lecture—3 hours. Recommended: courses 4A, 4B, 131A. Western European history from about 1500 to about 1650. Mr. Fleischer

131C. Early Modern European History. (4) III.

Lecture—3 hours. Recommended: courses 4A, 4B, 131B. Western European history from about 1650 to about 1789. Mr. Fleischer

***133A. Age of Reason. (4) I.**

Lecture—3 hours. Topics in the intellectual history of the seventeenth and early eighteenth centuries. From Bacon to Newton and Locke. Mr. Schwab

133B. Age of Reason. (4) II.

Lecture—3 hours. The Enlightenment of the eighteenth century. An intellectual and social history. Mr. Schwab

134. The French Revolution and the Napoleonic Era. (4) III.

Lecture—3 hours. Ideas and institutions in Europe during the French Revolution and the Napoleonic era. Mr. Schwab

137A. Russian History: Kievan and Muscovite Russia. (4) I.

Lecture—3 hours. Russian civilization from earliest times to the reign of Peter the Great. Mr. O'Brien

137B. Russian History: The Empire to 1856. (4) II.

Lecture—3 hours. Russian civilization from the Age of Peter the Great through the Crimean War. Mr. O'Brien

137C. Russian History: The Empire, 1856-1914. (4) I.

Lecture—3 hours. Russian civilization from the Crimean War to the outbreak of the First World War.

137D. Russian History: Soviet Russia. (4) II.

Lecture—3 hours. Russia from the Revolution of 1917 to the Age of Stalin.

* Not to be given, 1968-69.

***139. Studies in Modern Russian History. (4) III.**

Lectures and discussion—3 hours. Prerequisite: course in Russian history before 1917; or consent of instructor. Reading in sources and monographs on the history of Russia from the time of Troubles to the Crimean War; lectures, discussions, and reports. Mr. O'Brien

141. France since 1815. (4) I.

Lecture—3 hours.

Mr. Willis

144A. History of Germany to 1815. (4) I.

Lecture—3 hours. Prerequisite: courses 4A and 4B. A history of the Germanies through the Congress of Vienna. Mr. Mork, Mr. Paret

144B. History of Germany since 1815. (4) II.

Lecture—3 hours. Prerequisite: courses 4C and 144A. The German national unification, the age of Bismarck and William II, and the wars and revolutions of the twentieth century.

Mr. Mork, Mr. Paret

145A. Europe in the Nineteenth Century. (4) II.

Lecture—3 hours. A survey of the history of Europe from 1815 to 1870.

145B. Europe in the Nineteenth Century. (4) III.

Lecture—3 hours. A survey of the history of Europe from 1870 to 1918.

146A. Europe in the Twentieth Century. (4) I.

Lecture—3 hours. A survey of the history of Europe from 1919 to 1939. Mr. Willis

146B. Europe in the Twentieth Century. (4) II.

Lecture—3 hours. A survey of the history of Europe since 1939. Mr. Willis

***147. Ideas and Politics in Twentieth-Century Europe. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: courses 4A, 4B, and 4C; or consent of instructor. Political, military, and intellectual history of Europe from the turn of the century to the present. Extensive source readings.

Mr. Paret

***148A. Diplomatic History of Modern Europe. (4) I.**

Lecture—3 hours. A survey of the diplomatic relations of the European powers from the eighteenth century to the middle of the nineteenth century.

***148B. Diplomatic History of Modern Europe. (4) II.**

Lecture—3 hours. A survey of the diplomatic relations of the European powers from the Crimean War to 1890.

***148C. Diplomatic History of Modern Europe. (4) III.**

Lecture—3 hours. A survey of the diplomatic relations of the European powers from 1890 to the 1930's.

***149. History of Military Thought and Policy from Machiavelli to the Present. (4) I.**

Lecture—3 hours. Prerequisite: courses 4A, 4B, 4C. Recommended: additional background in history, political theory, or sociology. An analysis of military affairs and of their interaction with intellectual, social, economic, and political history since the Renaissance.

Mr. Paret

151A. History of England. (4) I.

Lecture—3 hours. Recommended: course 4A. A survey of English history to the latter part of the fifteenth century.

Mr. Woodfill

151B. History of England. (4) II.

Lecture—3 hours. Recommended: courses 4A, 4B, and 151A. A survey of English history from the latter part of the fifteenth century to the latter part of the eighteenth century.

Mr. Woodfill

151C. History of England. (4) III.

Lecture—3 hours. Recommended: courses 4B, 4C, 151A, and 151B. A survey of English history from the latter part of the eighteenth century to the present.

Mr. Woodfill

***152A. English Constitutional History. (4) II.**

Lecture—2 hours; discussion—2 hours. Recommended: course 151A. From Anglo-Saxon times to the reign of Edward IV. Mr. Woodfill

***152B. English Constitutional History. (4) III.**

Lecture—2 hours; discussion—2 hours. Recommended: courses 151B or 154, 151C, and 152A. From the reign of Edward IV to the present.

Mr. Woodfill

154. Tudor and Stuart England. (4) III.

Lecture and discussion—3 hours. Prerequisite: consent of instructor. Recommended: courses 151A and 151B.

Mr. Woodfill

***158A. The British Empire in the Nineteenth Century. (4) II.**

Lecture—3 hours. Prerequisite: course 4C; courses 151B, 151C recommended. The development of Britain's overseas empire, and the evolution of colonial policies, to the Boer War.

***158B. The British Empire in the Twentieth Century. (4) III.**

Lecture—3 hours. Prerequisite: course 4C. Recommended: courses 151B, 151C. The evolution and decline of the British Empire from the Boer War to the 1950's.

160. History of the West Indies, 1492-1800. (4) II.

Seminar—3 hours. Prerequisite: consent of the instructor. Study of selected topics on European expansion in the West Indies to 1800,

* Not to be given, 1968-69.

with special emphasis on social and economic developments. Limited enrollment.

Mr. Jacobson

161A. Latin American History. (4) I.

Lecture—3 hours. Colonial history of Latin America.

Mr. Corwin

161B. Latin American History. (4) II.

Lecture—3 hours. The national period of Latin American history.

Mr. Corwin

162. History of Cuba and the Spanish Caribbean. (4) III.

Lecture—3 hours. Prerequisite: courses 161A and 161B or consent of instructor. The history of Cuba and the Spanish Caribbean since 1492, including discovery and settlement, slavery and the plantation economy, independence movements, and United States relations with the island republics. Emphasis on the period since 1898. Offered in odd-numbered years.

Mr. Corwin

163. History of Brazil. (4) I.

Lecture—3 hours. The history of Brazil since 1500, dealing with the colonial origins and subsequent development of political, economic, and social institutions. Emphasis on the period since independence.

Mr. Poppino

164. History of Argentina. (4) III.

Lecture—3 hours. Prerequisite: courses 161A and 161B or consent of instructor. The history of Argentina from about 1800 to the present, stressing the contributions of the colonial heritage and nineteenth-century political, economic, and social developments to the rise of Argentine nationalism. Offered in even-numbered years.

Mr. Corwin

165. Latin American Social Revolutions. (4) III.

Lecture—3 hours. Prerequisite: a reading knowledge of Spanish is recommended. Major social upheavals since 1900 in Mexico, Argentina, Brazil, Bolivia, Guatemala, and Cuba, examined as to similarities and differences in causes, course, and consequences. Offered in odd-numbered years.

Mr. Poppino

166. History of Mexico. (4) III.

Lecture—3 hours. The colonial origin and development of the Mexican nation; its political, economic, and social institutions. Emphasis on the period since 1910.

Mr. Corwin

167. Proseminar in Latin American History. (4) I, III.

Discussion—4 hours. Prerequisite: courses 161A or 161B, or the equivalent; consent of instructor. Recommended: reading knowledge of Spanish or Portuguese. Research and writing on selected topics in Latin American history.

Mr. Corwin, Mr. Poppino

168. History of Inter-American Relations. (4) III.

Lecture—3 hours. Prerequisite: a reading knowledge of Spanish or Portuguese is recommended. Diplomatic history of Latin America since independence, intra-Latin American relations, relations with the U.S., participation in international organizations, and communism in Latin America. Offered in even-numbered years.

Mr. Poppino

***169. Anglo-American Relations in the Nineteenth Century. (4) I.**

Lecture—3 hours. The interaction of economic, political, and strategic factors in the relations between Great Britain and the Americas during the nineteenth century.

170A. Colonial America. (4) I.

Lecture—3 hours; discussion—1 hour. 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.

Mr. Jacobson

170B. The American Revolution. (4) II.

Lecture—3 hours. An 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.

Mr. Jacobson, Mr. Goodman

***170C. The Early National Period. 1789–1815. (4) III.**

Lecture—3 hours. The political and social history of the American republic from the adoption of the Constitution through the War of 1812 and its consequences.

Mr. Goodman

***171A. The Jacksonian Era. (4) III.**

Lecture—3 hours. The political and social history of the American Republic from the end of the War of 1812 to the Compromise of 1850.

Mr. Calhoun

171B. American Civil War. (4) I.

Lecture—3 hours. Major developments in American history from 1848 to 1865: slavery and antislavery, immigration, sectional conflict, emergence of the Republican party, the Civil War.

171C. The Emergence of Modern America. (4) II.

Lecture—3 hours. From Reconstruction to the twentieth century, including political and intellectual change, the advent of big business, the rise of organized labor, ethnic adjustments, urbanization, and movements of social unrest.

Mr. Brody

174A: Recent History of the United States. (4) I.

Lecture—3 hours; discussion—1 hour. Study of political, economic, and cultural aspects of American democracy from 1900 to 1930's.

Mr. Shideler, Mr. Swain

* Not to be given, 1968–69.

174B. Recent History of the United States. (4) II.

Lecture—3 hours; discussion—1 hour. Study of political, economic, and cultural aspects of American democracy from the 1930's to the present. Mr. Brody, Mr. Swain

175A. Intellectual History of the United States. (4) I.

Lecture—3 hours. Prerequisite: course 17A or its equivalent; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. American social thought from colonial times to the 1860's. Emphasis upon Puritanism, the American Enlightenment, Transcendentalism, Jacksonian democracy, in the context of ideas about the nature of man and his freedom and the idea of progress. Mr. Smith

175B. Intellectual History of the United States. (4) II.

Lecture—3 hours. Prerequisite: courses 17A and 17B; or a course in philosophy since the Renaissance, political theory, American literature, or sociological theory. American social thought from the 1860's to the present. Emphasis upon the social relevance of philosophical and religious idealism, naturalism, and pragmatism. Mr. Smith

176A. Social and Cultural History of the United States. (4) III.

Lecture—3 hours. A study of social and cultural forces in American society from colonial times through reconstruction and the post-Civil War industrial expansion, with emphasis on class structure, religious movements, labor systems, racial and national groups, social reform movements, changes in social values. Offered in odd-numbered years. Mr. Marchand

176B. Social and Cultural History of the United States. (4) III.

Lecture—3 hours. A study of social and cultural forces in American society from 1880 to the present with emphasis on class structure, religious movements, labor systems, racial and national groups, social reform movements, and changes in social values. Offered in even-numbered years. Mr. Marchand

***178A. Great Issues in United States History: Ideas and Interpretations. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: junior standing; or consent of instructor. Selected topics in the political, economic, social and intellectual history of the United States. A study in historical thought and interpretation concerning the main currents of national development to 1865. Mr. Jackson

***178B. Great Issues in United States History: Ideas and Interpretations. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: junior standing; or consent of instruc-

tor. Selected topics in the political, economic, social and intellectual history of the United States. A study in historical thought and interpretation concerning the main currents of national development since 1865. Mr. Jackson

***179A. Economic Growth of the United States. (4) II.**

Lecture—3 hours. Development of the American economy from colonial agriculture and mercantilism to the emergence of industrial capitalism.

***179B. Economic Growth of the United States. (4) III.**

Lecture—3 hours. The changing nature of industrial capitalism and its effects on agriculture, labor, business, and government in the late nineteenth and twentieth centuries. Mr. Brody

***180. The Westward Movement to 1850. (4) III.**

Lecture—3 hours. The political, economic, and social significance of the westward movement from colonial times to 1850.

Mr. Sherwood

183A. The Frontier Experience: Trans-Mississippi West. (4) I.

Lecture—3 hours; discussion—1 hour. 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. Mr. Jackson

183B. The Frontier Experience: Trans-Mississippi West. (4) II.

Lecture—3 hours; discussion—1 hour. 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.

Mr. Jackson

***185A. History of Science and Technology in America. (4) II.**

Lecture—3 hours. A study of science and technology in America, emphasizing the development of scientific ideas and institutions, to 1890.

Mr. Sherwood, Mr. Swain

***185B. History of Science and Technology in America. (4) III.**

Lecture—3 hours. A study of science and technology in America, emphasizing the development of scientific ideas and institutions, since 1890.

Mr. Sherwood, Mr. Swain

187. Issues in American Educational History. (4) III.

Lecture—3 hours; discussion—1 hour. An exploration of the patterns by which educational institutions have developed, with emphasis

* Not to be given, 1968-69.

sis, on the ways in which Americans have used the transmission of culture between generations as a focus for general social criticism. Offered in odd-numbered years. Mr. Calhoun

***188A. History of Agriculture in the United States. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: junior or senior standing. History of agricultural development to 1900 with emphasis on social and economic institutions.

Mr. Shideler

***188B. History of Agriculture in the United States. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: junior or senior standing. History of agricultural changes from 1900 to the present with emphasis on the background and evolution of government policy.

Mr. Shideler

189A. History of California. (4) III.

Lecture—3 hours; discussion—1 hour. History of California to 1865. Offered in odd-numbered years.

Mr. Jackson

***189B. History of California. (4) III.**

Lecture—3 hours; discussion—1 hour. History of California since 1865. Offered in even-numbered years.

Mr. Jackson

***190A. East Asian Civilization. (4) I.**

Lecture—3 hours. The culture and history of East Asia to 1600. Emphasis on China and Japan; attention also to Southeast Asia. Offered in odd-numbered years.

Mr. Liu

***190B. East Asian Civilization. (4) II.**

Lecture—3 hours. The culture, history, and problems of East Asia since 1600. Emphasis on China and Japan; attention also to Southeast Asia. Offered in even-numbered years.

Mr. Liu

191A. Early Imperial China. (4) I.

Lecture—3 hours; discussion—1 hour. Chinese history to 960 with emphasis on the basic ideas and institutions which have molded the culture and society of China. Offered in odd-numbered years.

Mr. Lo

191B. Late Imperial China. (4) II.

Lecture—3 hours; discussion—1 hour. China, 960 to 1800, with attention to the growth of autocracy, economic and intellectual development, and problems of foreign relations. Offered in even-numbered years.

Mr. Lo

191C. Modern China. (4) III.

Lecture—3 hours; discussion—1 hour. The revolutionary transformation of China from the nineteenth century to the present.

Mr. Lo

***192. Modern China and the West. (4) III.**

Lecture—1½ hours; discussion—1½ hours. Prerequisite: course 190B or 191C; or consent

* Not to be given, 1968–69.

of instructor. Readings and reports on selected topics.

Mr. Liu

***193. China's Relations with Southeast Asia. (4) I.**

Lecture—3 hours; discussion—1 hour. China's historical relations with Southeast Asia—military, political, cultural, and economic. Offered in odd-numbered years.

Mr. Lo

194. Japan. (4) II.

Lecture—3 hours. The society, culture, and foreign relations of Japan to the present. Offered in odd-numbered years.

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

Prerequisite: consent of instructor. The Staff

Graduate Courses

201. Sources and General Literature of History.

(4) I, II, III.

Seminar—3 hours. Designed primarily for students preparing for higher degrees in history. A. Ancient; B. Medieval; C. Renaissance and Reformation; D. Modern Europe to 1815; E. Europe since 1815; F. Russia to 1801; G. Russia since 1801; H. China to 1600; I. China since 1600; J. Britain to 1789; K. Britain since 1603; L. Latin America since 1810; M. American History to 1787; N. United States, 1787–1896; O. United States since 1896.

The Staff

***211. Ancient History. (4) II.**

Seminar—3 hours. Prerequisite: course 111A, 111B, 111C. A seminar dealing with the various aspects of Near Eastern and Greco-Roman civilization.

Mr. Spyridakis

221. Medieval History. (4) II.

Seminar—3 hours. Recommended: courses 121A, 121B, and 121C. Topics in the history of medieval Europe.

Mr. Bowsky

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.

Mr. O'Brien

242. History of the Enlightenment. (4) III.

Seminar—3 hours. Prerequisite: a reading knowledge of French. Intellectual and social history of Europe during the Enlightenment. May be repeated for credit.

Mr. Schwab

***245. History of the Napoleonic Era. (4) I, II.**

Seminar—3 hours. Prerequisite: reading knowledge of French or German and consent of instructor. Political, intellectual, social, and military history of Europe from the Consulate to the Congress of Vienna.

Mr. Paret

246. Europe in the Twentieth Century. (4) III.

Seminar—3 hours. Political history of Europe since 1919, with particular emphasis on the post-1939 period.

Mr. Willis

***248A-248B. Modern European Diplomatic History.** (4-4) II-III.

Seminar—3 hours. Prerequisite: reading knowledge of French or German; courses 148B and 148C; or consent of instructor. Bibliography and topics in the diplomatic history of Europe from the French Revolution to the 1930's, with emphasis on the nineteenth century.

***249. Military Theory, Institutions, and Policy since the Renaissance.** (4) II, III.

Seminar—3 hours. Mr. Paret

251. English History. (4) I, II.

Seminar—3 hours. Recommended: courses 151A, 151B, and 151C; 152A and 152B; 154. Mr. Woodfill

261. Latin American History. (4) I, III.

Seminar—3 hours. Prerequisite: two courses in Latin American history; reading knowledge of Spanish or Portuguese.

Mr. Corwin, Mr. Poppino

270. Early American History. (4) III.

Seminar—3 hours. Mr. Jacobson

***271. History of the United States, 1760-1815.**

(4) I.

Seminar—3 hours. Mr. Goodman

***272. History of the United States, 1815-1848.**

(4) I, II.

Seminar—3 hours. Mr. Calhoun

***273. History of the United States, 1848-1900.**

(4) I, II.

Seminar—3 hours.

274. Recent History of the United States. (4) III.

Seminar—3 hours. Topics in twentieth century American history. Mr. Swain

275. American Social and Intellectual History.

(4) I, III.

Seminar—3 hours. Prerequisite: courses 175A, 175B or their equivalent; or consent of the instructor. Studies in the recent historiography of, or research in, American social and

intellectual history. May be repeated for credit.

Mr. Smith

277. Nineteenth Century American Institutions.

(4) II.

Seminar—3 hours. Churches, schools, professions, urban growth, and social mobility in nineteenth century America. Mr. Smith

279. History of the United States: the Twentieth Century. (4) II.

Seminar—3 hours. Emphasis on social and economic developments. Mr. Brody

***283. History of the United States: The Frontier.** (4) I.

Seminar—3 hours. Mr. Jackson

***288. History of the United States.** (4) II, III.

Seminar—3 hours. Prerequisite: graduate standing. Emphasis on agricultural history and closely related topics such as exports, transportation and politics. Mr. Shideler

291A-291B. Chinese History. (4-4) I-II.

Seminar—3 hours. Prerequisite: consent of instructor. Research on topics to be chosen by the student, aiming at the writing of papers of article length. Mr. Liu, Mr. Lo

291C. Chinese History. (4) III.

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. Mr. Lo

299. Research. (1-6) I, II, III.

The Staff

299D. Individual Study. (1-6) I, II, III.

The Staff

Professional Course

300. The Teaching of History in the Secondary School and the Junior College. (3) III.

Lecture—3 hours. Prerequisite: junior or senior standing with a teaching major or minor in social studies. Methods for the presentation of history at the secondary and junior college level.

* Not to be given, 1968-69.

HOME ECONOMICS EDUCATION—See Family and Consumer Sciences

HOME MANAGEMENT—See Family and Consumer Sciences

HUMAN DEVELOPMENT—See Family and Consumer Sciences

INSTITUTION MANAGEMENT—See Family and Consumer Sciences

INTERNATIONAL AGRICULTURAL DEVELOPMENT

William A. Williams, Ph.D., *Chairman of the Committee*
Committee Office, 109 Hunt Hall

Committee in Charge:

- Floyd D. Carroll, Ph.D. (*Animal Science*)
- Duane S. Mikkelsen, Ph.D. (*Agronomy*)
- Leonard O. Myrup, Ph.D. (*Agricultural Engineering*)
- Klayton E. Nelson, Ph.D. (*Viticulture and Enology*)
- Lynn D. Whittig, Ph.D. (*Soil and Plant Nutrition*)

Departmental Major Adviser.—See *Schedule and Directory Listing*.

Bachelor of Science major program and Graduate, See pages 81 and 133.

Upper Division Courses

101. Crop Production under Tropical Conditions. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: Plant Science 2 or Botany 2. Climatic and soil adaptation; varieties and varietal improvement in annual and perennial crops; pests, diseases, and their control; fertilization and other management practices. Mr. W. G. Davis

102. Livestock and Poultry Production in Developing Areas. (4) I.

Lecture—4 hours. Prerequisite: Animal Science 10, Nutrition 103. Kinds of livestock and poultry suited to developing areas; feed-stuff resources and their utilization; ecological problems including pests, diseases and their control; management practices.

Mr. Carroll, Mr. Kratzer, Mr. Wilson

190. Proseminar in International Agriculture Development. (2) III.

Lecture—1 hour; discussion—1 hour. Prerequisite: consent of instructor. Problems of coordinating principles and information from technical agriculture and the social sciences in the context of economic development. Mr. Smith

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.
The Staff (Mr. Akesson in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Hedges in charge)

INTERNATIONAL AGRICULTURAL DEVELOPMENT (A Graduate Group)

*Trimble R. Hedges, Ph.D., *Chairman of the Group*
Group Office, 220 Voorhies Hall

Graduate Courses

280. Social, Technological, and Other Factors in Agricultural Development. (3) II.

Seminar—3 hours. Problem identification and analysis in agricultural development; cultural forces; political, social, and economic organiza-

tion; human factors in relation to resource use and technology, function and use of the change agent; program development, planning and execution.

Mr. Hedges

299. Research. (1-9) I, II, III.

The Staff (Mr. Whittig in charge)

INTERNATIONAL RELATIONS

Paul E. Zinner, Ph.D., *Chairman of the Committee*
Committee Office, 257 Voorhies Hall

Committee in Charge:

Professors:

- Bennett M. Berger, Ph.D. (*Sociology*)
- Homero Castillo, Ph.D. (*Spanish*)
- James H. Shideler, Ph.D. (*History*)
- Paul E. Zinner, Ph.D. (*Political Science*)

Associate Professor:

Elias H. Tuma, Ph.D. (*Economics*)

Major Adviser: See *Schedule and Directory*.

International relations embraces the social relationships which transcend the boundaries of national states. The major in international re-

^a Absent on leave, fall quarter, 1968.

lations is devised to meet the needs of students interested in acquiring an understanding of the forces and influences conditioning present-day world politics and economics, as well as the main problems and policies of organized states in their relations with one another. Because these problems and policies must be dealt with and determined by governments, the major is built around courses dealing with intergovernmental diplomatic and economic relations. However, it cuts across departmental lines, for foreign policies are made in relation to political, geographic, economic, and social conditions, and in the light of historical precedents.

The Major Program

Language requirement: approximately 28 quarter units in one modern foreign language.

Lower Division Courses.—Required: Economics 1A, 1B; History 4A or 4B, 4C, 17A, 17B; Political Science 1A, 1B, 2, 3.

Upper Division Courses.—Economics 8 quarter units (115A and 115B; 116 and 117; or 160 and 161); political science 12 quarter units (124, 128A, and 128B); history 8 quarter units exclusive of United States history; 8 additional units in related courses selected in consultation with the adviser.

Attention is directed to the following courses as useful in the study of certain aspects of this field: History 137C, 137D, 141, 144B, 146A, 146B, 148C, 149, 151C, 161B, 162, 191C,

192, 194; Political Science 122B, 123, 131, 132, 134, 137, 139, 142, 143, 145, 149; Sociology 3, 118, 130, 141, 142, 145.

The student should also consider taking relevant courses in anthropology, geography, history of the arts, literature, and philosophy.

Teaching Major.—Required: Economics 1A-1B; History 4A or 4B, 4C, 17A-17B; Political Science 1A-1B, 2, 3; approximately 28 quarter units in one modern foreign language; Economics 115A and 115B or 116 and 117 or 160 and 161; Political Science 124, 128A-128B; 8 quarter units of history exclusive of United States history; 8 additional quarter units in related courses selected in consultation with the adviser.

For the secondary credential: a *combined total of 36 quarter units of upper division work* in the fields of political science, history, including economics and at least 20 quarter units of upper division or graduate course work in either political science or history.

For the elementary credential: Since the interdepartmental major for the A.B. degree requires a combined total of 36 quarter units of upper division work in the fields of political science, history, and economics, this meets the minimum state requirement of 24 semester hours of upper division or graduate course work in two or more subjects normally taught in the public schools in the social sciences.

Subject Representative: Mr. Zinner

ITALIAN

Department Office, 515 Sproul Hall

Assistant Professor:

Alfredo A. Bonadeo, Ph.D.



Lecturer:

Jonathan L. Butler, M.A.

Departmental Major Adviser.—Mr. Jonathan Butler.

The Major Program

Lower Division Courses.—Required: Italian 1, 2, 3, 4, 5, and 6 or their equivalents. Recommended: one year of college Latin or a Romance Language.

Upper Division Courses.—Required: at least 36 units of upper division courses of which two may be chosen from department-approved courses in related fields.

Honors and Honors Program (see page 113). The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—A minimum of at least 30 units in Italian of which 12 are upper division units including Italian 101 and 102.

Lower Division Courses

A course may not ordinarily be taken for credit if it is a prerequisite to a course already completed. Students offering high school language preparation as a prerequisite must take a placement test.

1. Elementary Italian. (4) I.

Laboratory—2 hours; recitation—3 hours.
The Staff

2. Elementary Italian. (4) II.

Laboratory—2 hours; recitation—3 hours.
Prerequisite: course 1. Continuation of course 1.
The Staff

3. Elementary Italian. (4) III.

Laboratory—2 hours; recitation—3 hours.
Prerequisite: course 2 or equivalent. Continuation of course 2.
The Staff

4. Intermediate Italian. (3) I.

Laboratory—1 hour; recitation—3 hours. Prerequisite: course 3 or equivalent. The Staff

5. Intermediate Italian. (3) II.

Laboratory—1 hour; recitation—3 hours. Prerequisite: course 4 or equivalent. Continuation of course 4. The Staff

6. Reading and Conversation. (4) III.

Recitation—4 hours. Prerequisite: course 5 or equivalent. Class discussion; reading of selected works; oral reports; analysis of texts. The Staff

Upper Division Courses***101. Advanced Conversation, Composition, and Grammar. (4) II.**

Lecture—3 hours. Prerequisite: course 6 or consent of the instructor. Mr. Butler

***102. Advanced Conversation, Composition, and Grammar. (4) III.**

Lecture—3 hours. Prerequisite: course 101 or consent of instructor. Offered in odd-numbered years. Mr. Butler

113A. Italian Literature before the Renaissance: from St. Francis to Petrarch. (4) II.

Lecture—3 hours. Prerequisite: course 6 or consent of the instructor. A study of the origins of lyrical forms of Italian literature of the thirteenth and fourteenth centuries. The development of an Italian standard of poetry, with emphasis on the Sicilian school of Poetry, The "Sweet New Style," and Petrarch. Mr. Butler

113B. Italian Literature before the Renaissance: Dante's Divine Comedy and Boccaccio. (4) III.

Lecture—3 hours. Prerequisite: course 6 or consent of the instructor. A study of the origins of non-lyrical forms of Italian literature of the thirteenth and fourteenth centuries. The *Divine Comedy* and the development of a prose style with emphasis on Boccaccio's *Decameron*. Mr. Butler

115A. Italian Literature of the Renaissance and the Baroque: from Humanism to Machiavelli. (4) I.

Lecture—3 hours. Prerequisite: course 6 or consent of the instructor. A detailed examination of the 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. Mr. Bonadeo

115B. Italian Literature of the Renaissance and the Baroque: from Cellini to Marino. (4) II.

Lecture—3 hours. Prerequisite: course 115A. A continued examination into the loss of an

ideal. Emphasis on the conflicts in Michelangelo and Tasso leading to Marino, with an excursus on Galileo's role in the formation of a modern literary standard. Mr. Bonadeo

***118. Italian Literature of the Eighteenth Century. (4) I.**

Lecture—3 hours. Prerequisite: course 6 or consent of the instructor. An examination of the struggle for the establishment of a modern Italian literature. Emphasis on the work of Goldoni, Bettinelli, Baretti, Parini, Alfieri and Vico. Offered in odd-numbered years.

Mr. Marelli

119. Italian Literature of the Nineteenth Century. (4) I.

Lecture—3 hours. Prerequisite: course 6 or consent of the instructor. The various aspects of romanticism in Italy; Manzoni, Verga and *Verismo*. Offered in even-numbered years.

Mr. Marelli

120A. Italian Literature of the Twentieth Century: The Novel (4) III.

Lecture—3 hours. Prerequisite: course 6 or consent of the instructor. A study into the development of the novel from Svevo to the present. Emphasis on the work of Svevo, Levi, Moravia, Pavese and Vittorini. Offered in odd-numbered years.

Mr. Marelli

***120B. Italian Literature of the Twentieth Century: Poetry and Drama. (4) III.**

Lecture—3 hours. Prerequisite: course 6 or consent of the instructor. The main trends in Italian poetry with emphasis on hermeticism; the theater of Luigi Pirandello and its role in the development of contemporary Italian drama. Offered in even-numbered years.

The Staff

194H. Special Study for Honors Students.**(5) I, II, III.**

Prerequisite: open only to honors students. Guided research leading to an honors paper.

The Staff

199. Special Studies. (1-4) I, II, III.

Prerequisite: consent of the instructor. Directed individual study for advanced undergraduate students.

The Staff

Professional Course**300. The Teaching of a Modern Foreign Language. (3) III.**

Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

The Staff

* Not to be given, 1968-69.

JAPANESE—See Oriental Languages**LANDSCAPE HORTICULTURE—See Plant Science****LATIN—See Classics****LAW**

Edward L. Barrett, Jr., LL.B., Dean of the School and Chairman of the Department
Department Office, TB-98

Professors:

Edward L. Barrett, Jr., LL.B.
 Edgar Bodenheimer, J.D., LL.B.
 Daniel J. Dykstra, LL.B., S.J.D.
 James E. Hogan, LL.B.
 Edward H. Rabin, LL.B.
 Mortimer D. Schwartz, LL.B., LL.M., M.S.
 (*Law Librarian*)
 John W. Whelan, LL.B.

Assistant Professor:

Dov M. Grunschlag, LL.B.

**Professors:**

Floyd F. Feeney, LL.B. (*Acting*)
 Paul N. Savoy, LL.B. (*Acting*)

Associate Professor:

Frank B. Baldwin III, LL.B., LL.M.
 (*Acting*)

Admission Requirements and Curriculum: for details consult the *Announcement of the School of Law*.

Professional Curriculum**First Year****200A–200B–200C. Introduction to Law and Equity.** (2–2–2) I–II–III.

Lecture—2 hours. Basic concepts of the law, the precedent system, reasoning in law, the historical roots of common law and equity, the forms of action, equitable remedies, fundamentals of statutory interpretation.

Mr. Bodenheimer

201A–201B–201C. Property. (3–3–2) I–II–III.

Lecture—3–3–2 hours. The development of the law of property, including estates and other interests in land, real property marketing and conveyancing, land-use control, and landlord-tenant problems.

Mr. Baldwin, —————

202A–202B. Contracts. (4–4) I–II.

Lecture—4–2–2 hours. The law of contracts,

including problems of formation, interpretation, performance, enforcement, and termination.

Mr. Whelan

203A–203B–203C. Pleading and Procedure in Civil Cases. (2–2–4) I–II–III.

Lecture—2–2–4 hours. The principles of pleading under the code system and the federal rules; jurisdiction of state and federal courts; modern pretrial, trial and appellate procedure.

Mr. Hogan

204A–204B. Torts. (4–4) I–II.

Lecture—4 hours. Intentional and unintentional invasions of interests of personality and property.

Mr. Dykstra

***206. Constitutional Law I.** (4) III.

Lecture—4 hours. An introductory analysis of the judicial process in constitutional cases; division of powers between the national government and the states.

Mr. Barrett

207. Legal Research and Writing. (2) III.

Lecture—2 hours. Small group instruction in the techniques of legal research and writing.

Mr. Schwartz

208. Criminal Law and Procedure. (5) III.

Lecture—5 hours. The elements and policies of selected criminal offenses; principles of evidence and procedure in criminal cases.

Mr. Savoy

Second and Third Year Courses***215A–215B–215C. Business Associations.****(3–2–2) I–II–III.**

Lecture—3–2–2 hours. Principles of agency and partnership, the process of incorporation, corporate control and management, and problems related to corporate finance and regulation.

—————, Mr. Dykstra

***216. Commercial Law I.** (3) I.

Lecture—3 hours.

***217. Constitutional Law II.** (3) III.

Lecture—3 hours. Constitutional limitations on governmental power.

Mr. Barrett

* Not to be given, 1968–69.

† Recommended for second-year students.

***218A-218B. Criminal Law and Procedure.**

(2-3) I-II.

Lecture—3-3 hours. A study of the elements and policies of selected criminal offenses; principles of evidence and procedure in criminal cases.

Mr. Baldwin

***219A-219B. Evidence. (3-2) II-III.**

Lecture—3-2 hours. An examination and evaluation of the basic rules governing the presentation of material in court by means of documents and the examination of witnesses.

Mr. Hogan

***220A-220B. Federal Taxation I. (3-2) I-II.**

Lecture—3-2 hours.

Mr. Rabin

***221A-221B-221C. Introduction to Estate Planning.**

(3-2-2) I-II-III.

Lecture—3-2-2 hours. The basic estate planning devices, including wills, trusts, and future interests.

Mr. Rabin, Mr. Baldwin

***222A-222B. Writing Seminar. (2-2) II-III.**

Seminar—2 hours. Limited enrollment. Subject matter emphasis of the sections will vary from professor to professor and from year to year.

The Staff

230. Family Law. (3) I.

Lecture—3 hours. Legal aspects of the problems of family organization and disorganization, and the domestic relations of husband and wife, parent and child.

Mr. Savoy

231. Legislation. (3) III.

Lecture—3 hours.

Mr. Whelan

232. Land Financing. (3) II.

Lecture—3 hours. A study of the history and principles of real estate mortgages and deeds of trust as security devices for financing land and other transactions.

Mr. Schwartz

***233. Philosophy of Responsibility and Punishment.**

(3) III.

Lecture—3 hours. Freedom of will and responsibility in the light of recent developments in philosophy and psychology; the significance of the concept of responsibility in the administration of criminal justice; modern approaches to the problems of punishment and rehabilitation. Enrollment by permission of instructor.

Mr. Bodenheimer

234. Agricultural Law Seminar. (No credit) I.

A series of discussions on problems of agricultural industries which have legal significance. Discussions will be led by invited faculty members from the College of Agricultural and Environmental Sciences and other related departments.

The Staff

235. Administrative Law. (3) I.

Lecture—3 hours.

Mr. Grunschlag

236. Securities Regulation. (3) III.

Lecture—3 hours. Prerequisite: course 215C. Legal problems of financing business enterprise under federal and state securities acts.

Mr. Dykstra

237. Commercial Law II. (3) II.

Lecture—3 hours.

238. Selected Problems in Comparative Law. (2) II.

Seminar—2 hours. A comparison of the handling of selected legal problems in various legal systems.

242. Conflict of Laws. (3-2) I, II.

Lecture—3-2 hours. Choice of law; legal problems arising from the territorial limitations of sovereignty.

Mr. Bodenheimer

243. Creditors' Remedies. (4) III.

Lecture—4 hours. Bankruptcy and other matters affecting debtor-creditor relations.

244. Criminal Procedure. (3) I.

Lecture—3 hours. Selected problems in procedure in criminal cases.

Mr. Savoy

245. Estate Planning and Taxation. (2-3) II-III.

Lecture—2-3 hours. Prerequisite: course 221C. Federal estate and gift taxes; federal income taxation as it affects trusts, estates and their beneficiaries.

Mr. Rabin

246. Federal Jurisdiction. (3) I.

Lecture—3 hours. Legal problems peculiar to the federal courts.

Mr. Grunschlag

247. Federal Taxation II. (4) I.

Lecture—4 hours. Prerequisite: course 220B.

248A-248B. International Business Transactions.

(2-2) I-II.

Lecture—2 hours.

249A-249B. International Organizations. (2-2) I-II.

Lecture—2 hours. The legal problems relating to international organizations.

250. Jurisprudence. (3) III.

Lecture—3 hours. A study of the philosophy of law.

Mr. Bodenheimer

251. Labor Law. (4) II.

Lecture—4 hours. The law governing employer-employee relations.

⁸ Recommended for second-year students.¹⁰ Required for second-year students.[•] Not to be given, 1968-69.

252. Selected Problems in Labor Law. (2) III.

Seminar—2 hours. Prerequisite: course 251.

256. Land Use Planning. (3) I.Lecture—3 hours. Zoning, subdivision control, and other methods for the regulation of land use.
Mr. Rabin**257. Law and Social Science. (2) II.**Seminar—2 hours. A study of the methodology of social science and its application to law.
Mr. Feeney**258. Legal Profession. (2) II.**Lecture—2 hours.
Mr. Barrett**259. Modern Social Legislation. (3) III.**Lecture—3 hours. An examination of legislation designed to secure adequate minimum standards of living.
Mr. Feeney**LINGUISTICS**Benjamin E. Wallacker, Ph.D., *Chairman of the Committee*
Committee Office, 331 Voorhies Hall**Committee in Charge:****Professors:**Martin A. Baumhoff, Ph.D. (*Anthropology*)
David L. Olmsted, Ph.D. (*Anthropology*)**Associate Professors:**Jarvis R. Bastian, Ph.D. (*Psychology*)
Wayne C. Harsh, Ph.D. (*English*)
Benjamin E. Wallacker, Ph.D. (*Oriental Languages*)**Assistant Professors:**Ronald A. Arbini, Ph.D. (*Philosophy*)
William M. Estabrook, Ph.D. (*German*)
George H. Keith, Ph.D. (*French and Italian*)
J. Rolf Kjolseth, Ph.D. (*Sociology*)
Eric S. Liu, Ph.D. (*Oriental Languages*)
Edward J. Tully, Jr., Ph.D. (*Mathematics*)**Lecturer:**Jonathan L. Butler, M.A. (*French and Italian*)H. Phelps Gates, Jr., B.A. (*Spanish and Classics*)Donald R. Vesper, M.A. (*Anthropology*)

Graduate Adviser.—Mr. Wallacker

35. Introduction to Linguistics. (4) III.Lecture—3 hours; laboratory—2 hours. Introduction to the study of language, its nature, diversity, and structure.
Mr. Gates**Upper Division Courses****139. Phonological Analysis. (4) I.**

Lecture—3 hours; discussion—1 hour. Pre-

* Not to be given, 1968-69.

260. Remedies. (4) II.

Lecture—4 hours. Alternate remedies available for the redress of substantive wrongs.

261. State and Local Government. (4) III.

Lecture—4 hours. Legal problems of state and local governmental agencies.

262. Trade Regulation. (2-3) II, III.Lecture—2-3 hours. Government regulation of trade practices with emphasis upon the antitrust laws.
Mr. Grunschlag**263. Trial Practice. (3) I.**Lecture—3 hours. Intensive study of practice problems in litigation.
Mr. Hogan***264. Natural Resources. (3) III.**

The law governing natural resources, with emphasis upon the law relating to water.

prerequisite: Anthropology 110B. Introduction to and application of phonological theory.
Mr. Vesper**140. Grammatical Analysis. (3) II.**

Lecture—3 hours. Prerequisite: Anthropology 110B. Introduction to the theory of grammatical analysis; practice in solving exercise problems.

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**202. Principles of Historical Linguistics. (3) I.**

Lecture—3 hours. Prerequisite: Anthropology 110C. Advanced treatment of the theory and method of historical linguistics.

210. Historical Germanic Linguistics. (4) II.

Seminar—3 hours. The principles and techniques of historical linguistics will be used to study the development of the Germanic languages from Proto-Indo-European through Proto-Germanic and into early Germanic dialects such as Old Norse, Gothic, Old Saxon, and Old English.

215. Computational Linguistics. (2) III.Lecture—2 hours. Prerequisite: consent of instructor. The use of electronic computers and other computational devices in linguistic analysis, mechanical translation, and lexicography.
Mr. Liu**220. Romance Linguistics. (4) II.**Seminar—3 hours. Prerequisite: consent of instructor. Phonology, morphology, and lexicography of the major Romance languages.
Mr. Keith

225. Modern Linguistic Theory. (3) III.

Lecture—3 hours. Prerequisite: course 140 and Anthropology 110B. Survey of leading con-

tributions to linguistic theory from de Saussure to the present.

299. Research. (1-12) I, II, III.

The Staff

MATHEMATICS

Edward B. Roessler, *Chairman of the Department*
Department Office, 824 Sproul Hall

Professors:

Henry L. Alder, Ph.D.
George A. Baker, Ph.D.
Curtis M. Fulton, Ph.D.
Charles A. Hayes, Jr., Ph.D.
Edward B. Roessler, Ph.D.
¹Sherman K. Stein, Ph.D.
Takayuki Tamura, D.Sc.

Associate Professors:

Hubert A. Arnold, Ph.D.
Dallas O. Banks, Ph.D.
Donald C. Benson, Ph.D.
¹Albert C. Burdette, Ph.D.
Gulbank D. Chakerian, Ph.D.
Kurt Kreith, Ph.D.
Gary J. Kurowski, Ph.D.
David G. Mead, Ph.D.
Donald A. Norton, Ph.D.

Assistant Professors:

David W. Barnette, Ph.D.
Carlos Borges, Ph.D.
Doyle O. Cutler, Ph.D.
Melvern R. Krom, Ph.D.
Milton P. Olson, Ph.D.
Washek F. Pfeffer, Ph.D.
George T. Sallee, Ph.D.
Robert W. Stringall, Ph.D.
Edward J. Tully, Jr., Ph.D.
Howard J. Weiner, Ph.D.

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Assistant Professors:

Charles E. Franti, Ph.D. (*Biostatistics*)
Maxwell W. J. Layard, M.S. (*Acting*)

Lecturers:

Robert L. Chazin, Ph.D.
Shirley A. Goldman, M.S.
Raymond N. Sproule, M.S.
Edward H. Theil, M.S.

Major Subject Advisers.—Mr. Alder, Mr. Baker, Mr. Benson, Mr. Borges, Mr. Chakerian, Mr. Cutler, Mr. Kreith, Mr. Krom, Mr. Mead, Mr. Norton, Mr. Sallee, Mr. Stein, Mr. Stringall, and Mr. Tully.

The Major Program

There are three programs: Bachelor of Arts, Plan I, Bachelor of Arts, Plan II (for prospective

teachers) and Bachelor of Science (for students who expect to continue the study of mathematics at the graduate level). Common to all three is the following:

First Two Years

	Freshman Year	Fall	Winter	Spring
Mathematics 21A, 21B, 21C	3	3	3	
Mathematics 11 (or its equivalent in high school)	2	—	—	
Mathematics 23	—	—	—	2
<i>Sophomore Year</i>				
Mathematics 22A, 22B, 22C	3	3	3	
Mathematics 108A	3	—	—	
Mathematics 24	—	2 (or) 2		

Under Plan II described below, 108B should be taken immediately after 108A and 30 some time in the first two years.

Bachelor of Arts, Plan I

First Two Years: described above and Physics 4A.

Upper division course. Required: 40 units, including 108A, 127A, 127B, 151A, one course in each of three areas listed below, at least 9 units in one area:

- a) Analysis—courses 127C, 118A, 118B, 119, 185A, 185B, 187.
- b) Foundations—courses 115A, 115B, 115C, 125, 126, 151B, 136A, 136B, 136C.
- c) Geometry—courses 112, 113, 114, 116, 141.

(d) Computer Sciences and Applications—courses 128A, 128B, 128C, 129, 168, 140.

(e) Statistics—courses 105A, 105B, 131A, 131B, 131C, 132A, 132B.

Those interested in applied mathematics (including computers), are advised to take 30 and 128A, 128B, 128C as well as 127A, 127B, 127C and 151A, 151B, 151C; those interested in statistics, 105A, 105B, 131A, 131B, 131C, 132A, 132B.

Bachelor of Arts, Plan II

First two years: described above and Physics 4A.

Upper division courses. Required: 108A, 108B, 139A, 139B, 139C, 140, 141, 136A, 136B, plus at least 9 units more of upper division courses in mathematics. The student is advised to take Physics 4B and courses in other departments that use mathematics.

Bachelor of Science

First two years: described above.

In addition to the courses specified below, the student is required to fulfill the language

¹ Absent on leave, 1968-69.

requirement for the B.S. degree by taking French, German, Russian or another foreign language acceptable to the mathematics department. Also required are Physics 104A, 104B, or an equivalent sequence of courses applying mathematics (e.g. Engineering 102A, 102B, 103A, 103B, 104A, 104B; Agricultural Economics 106A, 106B).

Upper division courses.—Required: at least 45 units including:

a) course 108A.

b) in the junior year: 127A, 127B, 127C, 151A, 151B, 151C, and either 115A, 185A, 185B, or 131A, 131B, 131C.

c) at least one of the sequences: 112 or 113, 114, 116; 128A, 128B, 128C; 118A, 118B, 119; 126, 147, 187; 125, 225A, 225B; 132A, 132B; 201A, 201B, 201C; 205A, 205B, 205C; 220A, 220B, 220C; 250A, 250B, 250C.

Those interested in applied mathematics (including computers) are advised to take courses 30, 128A, 128B, 128C; those interested in statistics courses 105A, 105B, 131A, 131B, 131C, 132A, 132B.

Graduate Study.—The Department of Mathematics offers programs of study and research leading to the M.A. and Ph.D. degrees in mathematics. Detailed information regarding graduate study may be obtained by writing to the Graduate Adviser, Department of Mathematics.

Qualifying Examinations.—A student entering from high school who believes that he has had the equivalent of a course offered by the Department of Mathematics (e.g., analytic geometry and calculus) may demonstrate his proficiency in this course by examination. If, in the opinion of the department, his level of achievement is sufficiently high, he will be permitted to enter the next course in the sequence. No University credit is earned by passing such an examination. Arrangements for an examination must be made with the department secretary in 822 Sproul Hall on or before the Monday of registration week.

Teaching Major.—Requirements for the teaching major are described for the B.A., Plan II.

Teaching Minor.—Thirty units of mathematics which must include: 4 units of fundamentals of mathematics (course 36A); 8 units of calculus (courses 11, 21A, 21B or 16A-16B-16C); 3 units of probability and/or statistics (courses 13, 15, or 131A); 3 units of geometry (course 37 especially recommended, 112, 113, 114, or 116).

The remainder of the 30 units are elective, except that students with a non-academic major must include 18 units in mathematics at the upper division or graduate level.

Subject Representative: Mr. Burdette.

Lower Division Courses

7. Topics in Algebra. (4) I, II.

Lecture—4 hours. Prerequisite: two years of high school algebra, plane trigonometry. Natural numbers; integers; rational, real, and complex numbers; permutations; combinations; theory of equations; matrices; determinants.

Mr. Arnold, Mr. Tully

11. Analytic Geometry. (2) I, II, III.

Lecture—2 hours. Prerequisite: two years high school algebra, plane geometry, plane trigonometry. Analytic geometry in one and two dimensions. Not open to students who have received credit for course 16A. (Formerly covered in courses 1A, 1B.)

The Staff

13. Elementary Statistics. (4) I, II, III.

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; non-parametric statistics; regression and correlation theory.

The Staff

15. Discrete Mathematics. (3) I, II.

Lecture—3 hours. Courses 15, 16A, and 16B constitute a year sequence recommended for students in the biological, management, and social sciences. Introduction to probability, vectors, and matrices. Applications to elementary Markov chains.

Mr. Arnold, Mr. Mead

16A. Analytic Geometry and Calculus. (3) I, II, III.

Lecture—3 hours. Prerequisite: one and one-half years of high school algebra, or course 15, plane geometry, plane trigonometry. Not open for credit to students who have received credit in course 21A. Only 2 units of credit allowed students who have received credit for course 11. A short course in analytic geometry and differential and integral calculus. Not recommended for students who may wish to major in the mathematical sciences. Courses 15, 16A, and 16B constitute a year sequence recommended for students in the biological, management, and social sciences.

The Staff

16B. Analytic Geometry and Calculus. (3) II, III.

Lecture—3 hours. Prerequisite: course 16A or 21A. Not open for credit to students who have received credit in course 21B. Continuation of course 16A.

The Staff

16C. Analytic Geometry and Calculus. (3) I, III.

Lecture—3 hours. Prerequisite: course 16B or 21B. Not open to students who have received credit for course 21B. Continuation of course 16B with special emphasis on the calculus of three dimensions including partial differentiation and total differentials; designed for students desiring to take physical chemistry.

The Staff

**21A-21B-21C. Calculus. (3-3-3) I-II-III;
II-III-I; III-I-II.**

Lecture—3 hours. Prerequisite: two years high school algebra, plane geometry, plane trigonometry and analytic geometry. (If analytic geometry has not been completed, course 11 may be taken concurrently. Only 2 units of credit will be allowed in course 21A for students who have received credit for 16A. For course 21B, only 2 units of credit will be allowed students who have received credit for 16B. Course 16C may be used as a prerequisite for course 21C.) Basic concepts of the calculus, derivatives, definite integral, fundamental theorem of calculus, partial derivatives, vector functions, multiple integrals.

The Staff

22A. Linear Algebra. (3) I, II, III.

Lecture—3 hours. Prerequisite: nine units of college mathematics. Matrices and linear transformations, determinants, complex numbers, quadratic forms.

The Staff

22B. Differential Equations. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 21C. Solutions of elementary differential equations.

The Staff

22C. Vector Analysis. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 21C. Green's theorem, Stoke's theorem, divergence theorem.

The Staff

23. Applications of the Calculus. (2) III.

Lecture—2 hours. Prerequisite: course 21C (may be taken concurrently). Significant applications of the calculus in various sciences.

The Staff

24. Infinite Series. (2) III.

Lecture—2 hours. Prerequisite: course 21C and 22A. Elements of infinite series including Fourier series and series with complex terms.

The Staff

30. Introduction to Computer Science. (3) I, II.

Lecture—2 hours; laboratory—2 hours. Prerequisite: two years of high school algebra. Introduction to the digital computer and its organization, coding and programming, use of compilers, flow charts, solutions of typical problems, code checking.

Mr. Norton

31. Algorithms for Computer Mathematics. (2) II.

Lecture—2 hours. Prerequisite: course 30. Introduction to assembly languages. The development and description of mathematical algorithms in computer dependent languages.

Mr. Norton

36A. Fundamentals of Mathematics. (4) I, II, III.

Lecture—4 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.

Mr. Barnette

36B. Fundamentals of Mathematics. (2) III.

Lecture—2 hours. Prerequisite: course 36A. The content will be selected from the following topics: number systems, set theory, number theory, the axiomatic method, topology, and combinatorics.

Mr. Mead

37. Topics in Geometry. (4) III.

Lecture—4 hours. Topics in Euclidian geometry selected from the theory of geometric transformations, the area and dissection of plane figures, convex polyhedra, foundations of geometry.

Mr. Barnette

Upper Division Courses**105A. Applied Statistical Methods: Analysis of Variance. (4) II, III.**

Lecture—4 hours. Prerequisite: course 13. Design of experiments including randomized complete block designs, Latin squares, split-plot designs, factorial designs, and incomplete block designs.

Mr. Weiner

105B. Applied Statistical Methods: Multiple Regression. (3) III.

Lecture—3 hours. Prerequisite: course 105A. Continuation of course 105A. Multiple regression and analysis of covariance.

Mr. Weiner

108A-108B. Introduction to Abstract Algebra and Analysis. (3-3) I-III-I, II.

Lecture—3 hours. Prerequisite: course 21C or 11B. Introduction to abstract mathematics, including the real number system, sets, mappings, mathematical induction, and algebraic structures.

Mr. Sallee, Mr. Kreith

112. Higher Geometry. (3) I.

Lecture—3 hours. Prerequisite: course 108A; or consent of instructor. Homogeneous point and line coordinates, cross ratio, one- and two-dimensional projective geometry, point and line conics. Offered in even-numbered years.

Mr. Fulton

***113. Synthetic Projective Geometry. (4) II.**

Lecture—4 hours. Prerequisite: course 108A; or consent of instructor. Duality, perspectivity, harmonic sets, projectivity, definition of conics, theorems on conics, pole and polar. Offered in even-numbered years.

Mr. Fulton

***114. The Theory of Convex Sets. (3) I.**

Lecture—3 hours. Prerequisite: courses 21C, 22A, 108A; or consent of instructor. Topics selected from the theory of convex bodies, convex functions, geometric inequalities, combinatorial geometry, and integral geometry. Offered in odd-numbered years.

Mr. Sallee

* Not to be given, 1968-69.

***115A. The Theory of Numbers. (3) I.**

Lecture—3 hours. Prerequisite: course 108A. Divisibility and related topics, diophantine equations, selected topics from the theory of prime numbers. Offered in odd-numbered years.

Mr. Alder

***115B. The Theory of Numbers. (3) II.**

Lecture—3 hours. Prerequisite: course 108A. Euler-function, Moebius function, congruences, primitive roots, quadratic reciprocity law. Offered in even-numbered years.

Mr. Alder

***115C. The Theory of Numbers. (3) III.**

Lecture—3 hours. Prerequisite: course 108A. Continued fractions, partitions. Offered in even-numbered years.

116. Metric Differential Geometry. (4) III.

Lecture—4 hours. Prerequisite: courses 22A, 22C or consent of instructor. Vector analysis, curves and surfaces in three dimensions. Offered in odd-numbered years.

Mr. Fulton

118A–118B. Introduction to Partial Differential Equations. (3–3) I–II.

Lecture—3 hours. Prerequisite: courses 22A, 22B, 22C. Solutions of partial differential equations of mathematical physics by separation of variables, series of orthogonal functions. Applications to boundary value problems. Mr. Banks

119. Theory of Ordinary Differential Equations. (3) III.

Lecture—3 hours. Prerequisite: courses 22A, 22B. Existence and uniqueness theorems, theory of linear equations of the second and higher orders, regular singular points, Sturm-Liouville systems, Laplace transforms.

Mr. Borges

125. Introduction to Mathematical Logic. (3) I.

Lecture—3 hours. Prerequisite: course 108A, or consent of instructor. Propositional calculus, predicate calculus, normal forms, completeness.

Mr. Krom

126. Introduction to the Theory of Sets. (3) I.

Lecture—3 hours. Prerequisite: course 21C; or consent of instructor. Fundamental concepts including cardinal numbers, order types, ordinal numbers.

Mr. Stringall

127A. Advanced Calculus. (4) I, II.

Lecture—4 hours. Prerequisite: courses 22A, 22C. The real number system, continuity, differentiation and integration on the real line, vector calculus and functions of several variables, theory of convergence.

Mr. Hayes

127B. Advanced Calculus. (4) II, III.

Lecture—4 hours. Prerequisite: course 127A. Continuation of course 127A.

Mr. Hayes

* Not to be given, 1968–69.

127C. Advanced Calculus. (4) I, III.

Lecture—4 hours. Prerequisite: course 127B. Continuation of course 127B.

Mr. Kroll, Mr. Hayes

128A–128B–128C. Numerical Analysis. (4–4–4) I–II–III.

Lecture—3 hours; laboratory—1 hour. Prerequisite: courses 22A, 22B, and 30 or a knowledge of Fortran. Finite differences, interpolation, polynomial approximation, numerical integration and differentiation, non-linear equations, systems of linear equations, matrices and eigenvalue problems, solution of ordinary and partial differential equations.

Mr. Kurowski

129. Theory of Compilers. (4) III.

Lecture—4 hours. Prerequisite: course 31. Theory of compilers; structure of computer languages, their limitations and ambiguities; study of a particular language.

Mr. Norton

131A–131B–131C. Introduction to Mathematical Statistics. (4–4–4) I–II–III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 21C or 16C. An introduction to the mathematical theory of probability and statistics.

Mr. Olson

132A–132B. Introduction to Stochastic Processes. (3–3) II–III.

Lecture—3 hours. Prerequisite: course 131A. Random walks, recurrent events, Markov chains, birth-and-death processes.

Mr. Weiner

136A–136B. Development of Mathematical Ideas. (3–3) I–II.

Lecture—3 hours. Prerequisite: course 21C. Topics and mathematicians studied with an emphasis on the origin of modern mathematics.

Mr. Chakerian, Mr. Krom

139A–139B–139C. Introduction to Algebra. (3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: course 22A. Theory of equations, symmetric functions, vector space aspects of Galois theory, Euclidean rings, integers in quadratic fields.

Mr. Tully

140. Applications of Mathematics. (3) III.

Lecture—3 hours. Prerequisite: course 108A. Applications of algebra, geometry and analysis in the natural, social and physical sciences.

Mr. Sallee

141. Euclidean Geometry. (3) II.

Lecture—3 hours. Prerequisite: course 108A. An axiomatic and analytic examination of Euclidean geometry from an advanced point of view. In particular, a discussion of its relation to other geometries. Offered in odd-numbered years.

Mr. Barnette

147. Topology. (3) II.

Lecture—3 hours. The basic notions of point-set and combinatorial topology. Mr. Borges

151A–151B–151C. Algebra. (4–4–4) A: I, III;

B: I, II; C: III.

Lecture—4 hours. Prerequisite: course 108A. Introduction to groups, rings, fields and linear transformations. Mr. Cutler, Mr. Mead

168. Linear Programming and Game Theory. (3) I.

Lecture—3 hours. Prerequisite: course 21C, 7 or 15. Introduction to zero-sum, two-person games; the fundamental theory for matrix games; basic concepts of linear inequalities; the duality theorem; the simplex method. Offered in even-numbered years. Mr. Sallee

185A. Geometry of Functions of a Complex Variable. (3) I, III.

Lecture—3 hours. Prerequisite: course 22C. Complex number system, Cauchy-Riemann equations, elementary functions, conformal mapping. Mr. Burdette, Mr. Theil

185B. Analysis of Functions of a Complex Variable. (3) I, II.

Lecture—3 hours. Prerequisite: course 185A. Cauchy's integral theorem, power series, Laurent series, residue theorem, special topics. Mr. Theil

187. Lebesgue Measure and Integration. (3) III.

Lecture—3 hours. Prerequisite: course 127C. Theory of Lebesgue measure and integration on the real line. Mr. Hayes

198. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Roessler in charge)

199. Special Study for Advanced Undergraduates. (1–5) I, II, III.

The Staff (Mr. Roessler in charge)

Graduate Courses**201A–201B–201C. Real Analysis. (3–3–3) I–II–III.**

Lecture—3 hours. Prerequisite: course 127C. Point set topology; Lebesgue measure and integration on the real line; abstract spaces; general measure and integration. Mr. Hayes

202A–202B–202C. Functional Analysis. (3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: courses 127C, 151C, 201C. Hilbert spaces, spectral theorem, Banach spaces, commutative Banach algebras. Mr. Kreith

205A–205B–205C. Functions of a Complex Variable. (3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: course 127C. Theory of analytic functions, Cauchy integral

theorem, power series, analytic continuation, conformal mapping, special functions.

Mr. Kroll

215A–215B–215C. Topology. (3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: graduate standing in mathematics or consent of instructor. Topics selected from point-set topology and homotopy theory. Mr. Borges

216. Integral Equations. (3) I.

Lecture—3 hours. Prerequisite: courses 22A, 127C. Volterra equations, Fredholm equations, symmetric kernels. Offered in odd-numbered years. Mr. Theil

218A–218B. Partial Differential Equations. (3–3) II–III.

Lecture—3 hours. Prerequisite: courses 22A, 127C; 216 recommended. Topics from the theory of first order, hyperbolic and elliptic partial differential equations. Offered in even-numbered years. Mr. Chakerian

***219. Ordinary Differential Equations. (3) I.**

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 odd-numbered years. Mr. Benson

220A–220B–220C. Mathematics for the Physical Sciences. (3–3–3) I–II–III.

Lecture—3 hours. Prerequisite: course 185 (may be taken concurrently). Topics in ordinary and partial differential equations, boundary value problems, functions of a complex variable, matrices, and calculus of variations. Mr. Kreith

225A–225B. Metamathematics. (3–3) II–III.

Lecture—3 hours. Prerequisite: courses 151A and either 125 or Philosophy 12; or consent of instructor. Axiomatizability, consistency, and completeness of the formalized mathematical theories; definability in formal languages; topics from the theory of models. Offered in odd-numbered years. Mr. Krom

228A–228B. Advanced Numerical Analysis of Ordinary Differential Equations. (3–3) I–II.

Lecture—3 hours. Prerequisite: course 128C. Numerical solutions of initial and boundary value problems for systems of ordinary differential equations; error analysis and stability. Offered in even-numbered years. Mr. Kurowski

* Not to be given, 1968–69.

231A-231B-231C. Mathematical Statistics.

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: courses 22C and 131C; or consent of instructor. A first year graduate course in theoretical statistics.

Mr. Baker

232. Analysis of Variance. (3) I.

Lecture—3 hours. Prerequisite: course 131C. Estimation and testing for the general linear hypothesis, components of variance, multiple comparisons.

Mr. Sproule

***233A-233B. Design of Experiments. (3-3) II-III.**

Lecture—3 hours. Prerequisite: course 232. Topics from balanced and partially balanced incomplete block designs, fractional factorials, and response surfaces.

Mr. Sproule

235A-235B-235C. Analytic Probability Theory.

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 187 or equivalent. Measure-theoretic foundations of probability, distribution functions and characteristic functions, law of large numbers and central limit theorems, conditional probabilities, martingales.

Mr. Weiner

236A-236B-236C. Advanced Mathematical Statistics. (3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: courses 127C and 131C. Distribution theory, parametric and nonparametric estimation, principles of statistical tests, sequential analysis, statistical decision functions.

Mr. Layard

237A-237B. Nonparametric Inference. (3-3) II-III.

Lecture—3 hours. Prerequisite: course 131C. A survey of non-parametric methods in estimation and hypothesis testing.

Mr. Sproule

238A-238B-238C. Analysis of Stochastic Processes. (3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 132B. The analytical theory of second-order stochastic processes, Poisson processes, birth-and-death processes, and Markov processes, including a study of statistical inference for these processes. Offered in even-numbered years.

Mr. Weiner

***240A-240B-240C. Differential Geometry.**

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 116. Transformation of coordinates, tensor analysis, intrinsic geometry of surfaces, parallel displacement, Riemannian manifolds, the geometry of

subspaces, subspaces of a flat space, application of tensor analysis to the theory of relativity. Offered in odd-numbered years. Mr. Chakerian

***245A-245B-245C. Algebraic Topology. (3-3-3) I-II-III.**

Discussion—3 hours. Prerequisite: course 215C. Algebraic invariants of spaces and their behavior with respect to continuous functions. Offered in even-numbered years. Mr. Pfeffer

250A-250B-250C. Algebra. (3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: graduate standing in mathematics; or consent of instructor. The theory of groups, rings, and fields.

Mr. Cutler

251A-251B. Theory of Groups. (3-3) I-II.

Lecture—3 hours. Prerequisite: graduate standing in mathematics; or consent of instructor. Normal subgroups, composition series, Sylow subgroups, nilpotent groups, solvable groups, group representations, groups with operators, group extensions, free groups, ordered groups.

Mr. Tamura

252. Linear Algebra. (3) I.

Lecture—3 hours. Prerequisite: graduate standing in mathematics; or consent of instructor. Vector spaces. Offered in even-numbered years.

Mr. Tully

253. Theory of Binary Systems. (3) III.

Lecture—3 hours. Prerequisite: graduate standing in mathematics; or consent of instructor. Elements of semigroups, quasigroups, and groupoids.

Mr. Tamura

290. Seminar. (1-6) I, II, III.

Advanced study in various fields of mathematics as follows: (a) algebra; (b) analysis; (c) geometry; (d) mathematical logic; (e) number theory; (f) topology; (g) theoretical statistics; (h) applied statistics; (i) applied mathematics.

The Staff

299. Research. (2-6) I, II, III.

The Staff

Professional Courses**300A. The Teaching of Mathematics. (3) I, II.**

Lecture—3 hours. Prerequisite: senior or graduate standing. Methods of teaching mathematics in grades K-6.

Mrs. Goldman

300B. The Teaching of Mathematics. (3) II.

Lecture—3 hours. Prerequisite: senior or graduate standing. Methods of teaching mathematics in grades 7-12.

Mrs. Goldman

* Not to be given, 1968-69.

MEDICINE

C. J. Tupper, M.D., *Dean of the School*
 Earl F. Wolfman, Jr., M.D., *Associate Dean*
 Loren D. Carlson, Ph.D., *Assistant Dean*
 Robert E. Stowell, M.D., Ph.D., *Assistant Dean*

Office of the Dean, Medical School

Professors:

- Robert J. Bolt, M.D. (*Internal Medicine*)
- Nemat O. Borhani, M.D., M.P.H. (*Internal Medicine, Community Health*)
- Robert H. Brownson, Ph.D. (*Anatomy*)
- Loren D. Carlson, Ph.D. (*Physiology*)
- Loring Chapman, M.D. (*Behavioral Biology*)
- Hamilton S. Davis, M.D. (*Anesthesiology*)
- Pierre Dreyfus, M.D. (*Neurology*)
- Paul D. Hoeprich, M.D. (*Internal Medicine*)
- Robert L. Hunter, Ph.D. (*Anatomy*)
- Demosthenes Pappagianis, M.D., Ph.D. (*Microbiology*)
- Robert Stempfel, Jr., M.D. (*Pediatrics*)
- Robert E. Stowell, M.D., Ph.D. (*Pathology*)
- Makepeace Tsao, Ph.D. (*Biochemistry—Surgery*)
- C. J. Tupper, M.D. (*Internal Medicine*)
- Earl F. Wolfman, Jr., M.D. (*General Surgery*)
- Julian R. Youmans, M.D., Ph.D. (*Neurosurgery*)

Associate Professors:

- Arnold C. L. Hsieh, M.D. (*Physiology*)
- Edward J. Hurley, M.D. (*Cardiac and Thoracic Surgery*)
- Jerry P. Lewis, M.D. (*Internal Medicine*)
- Antonio Zappala, M.D. (*Anatomy*)

Assistant Professors:

- Richard P. Anderson, M.D. (*General and Thoracic Surgery*)
- John R. Beljan, M.D. (*General Surgery*)
- Louis Conway, M.D. (*Neurosurgery*)
- Carroll E. Cross, M.D. (*Internal Medicine*)
- Nanine S. Henderson, Ph.D. (*Anatomy*)
- Glenn W. Kindt, M.D. (*Neurosurgery*)
- Warren G. Kinzey, Ph.D. (*Anatomy and Anthropology*)
- Stanley Meizel, Ph.D. (*Anatomy*)
- Edwin S. Munson, M.D. (*Anesthesiology*)
- Lawrence Rabinowitz, Ph.D. (*Physiology*)
- G. Henry Schmitt, Ph.D. (*Pharmacology*)
- Captane P. Thomson, M.D. (*Psychiatry*)
- Lowell Wilson, M.D. (*Internal Medicine*)



Professors:

- Thierry A. Freyvogel, Dr.Phil. (*Visiting Anatomy*)
- Calvin W. Schwabe, D.V.M., Sc.D. (*Epidemiology and Preventive Medicine*)
- Irving H. Wagman, Ph.D. (*Animal Physiology*)

Associate Professor:

- Robert T. Patrick, M.D. (*Acting; Anesthesiology*)

Assistant Professor:

- Robert E. Smith, Ph.D. (*Physiological Sciences*)

Lecturers:

- Reed M. Nesbit, M.D. (*Surgery*)
- Richard F. Walters, Ph.D. (*Biostatistics*)

Instructors:

- Thomas Hakala, M.D. (*Surgery*)
- Lois F. O'Grady, M.D. (*Internal Medicine*)

Admission Requirements and Curriculum.—The curriculum is currently being completed for the opening class in the fall quarter of 1968. For a general description, see page 121. Details will be available subsequently through the *Announcement of the School of Medicine*.

Human Anatomy

Upper Division Course

102. General Human Anatomy. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biology 1; Physiology 2, 2L or Zoology 2 recommended. Demonstration and laboratory study of prepared human dissections, models, roentgenograms, and microscopic materials. Not open to premedical students.

Graduate Course

298. Group Study. (1-5) III. The Staff

Anesthesiology

Graduate Course

201. Principles of Anesthesiology. (1) II.

Lecture—1 hour. Prerequisite: senior standing in the Schools of Medicine or Veterinary Medicine or consent of instructor. Application of physiologic and pharmacologic principles for the proper management of the anesthetized subject, with consideration of comparative aspects where appropriate. Resuscitation and monitoring are included. Messrs. Davis, Patrick, Munson

MICROBIOLOGY—See Also Veterinary Microbiology**MICROBIOLOGY****(A Graduate Group)**

Herman J. Phaff, Ph.D., *Chairman of the Group*
 Group Office, 134 Cruess Hall

Graduate Courses**290. Seminar (1) I, II.**

Seminar—1 hour. One seminar is offered during the fall and winter quarters. One weekly meeting is held.
 The Staff

299. Research. (1-12) I, II, III.

Laboratory—variable. Research under the guidance of dissertation committee. The Staff

MICRONESIAN LANGUAGES—See Oriental Languages**MILITARY SCIENCE**

Max V. Kirkbride, Colonel, *Chairman of the Department*
 Department Office, 125 Gymnasium

Professor:

Max V. Kirkbride, Colonel

Associate Professor:

Edward B. Hempstead, Major

Assistant Professors:

Richard D. Meriaux, Major, Infantry
 Donald H. Conrad, Captain, Infantry

In addition to courses offered in the Department of Military Science, upper division military science requires the completion of six units outside the department which may fulfill dual requirements for the baccalaureate degree in the Colleges as well as for the commission as a Second Lieutenant of the United States Army Reserve. One dual-credit unit must be taken in Physical Education 10 (Physical Conditioning Activities). The remaining five dual-credit units may be completed in any of the general areas of natural science, psychology, effective communication, or political science. Elected subjects must be taken while enrolled in the advanced course. In the event that a subject was required in the student's normal academic curriculum during his freshman and sophomore years, electives must be selected either from another general area or from advanced subjects in the same area. Conversely, for subjects not required in the student's academic curriculum during his freshman and sophomore years, complete freedom of selection from the four academic areas is permissible.

Lower division Military Science requires the completion of two units outside the department during the freshman year. The subject elected for ROTC credit may be one that is required in the student's normal academic curriculum during his freshman year; but it must be from one of the general subject areas mentioned above.

The chairman of the department will evaluate and approve the elective subjects selected. Consideration will be given to the value of the subjects in furthering the professional qualifications of the student as a prospective commissioned officer in the United States Army.

College of Letters and Science.—The Bachelor of Arts degree requires the completion of 180 units, of which 150 units must be in courses chosen from the Letters and Science List of Courses. The 9 units of lower division military science courses are included in the list. Upper division military science courses are considered off the Letters and Science List of Courses. They must be counted in the 20-unit allowance as indicated above. The dual-credit units in general areas may be selected from the List of Courses.

College of Agriculture.—The Bachelor of Science degree in agriculture requires the completion of 180 units. All units of upper and lower division military science courses combined may be accredited toward this requirement. The dual-credit units in general areas may be selected from upper division courses required by the College of Agriculture.

College of Engineering.—Six units of military science may be accredited toward the requirement of the College of Engineering for the Bachelor of Science degree. The dual-credit units in general areas may be selected from upper division courses required by the College of Engineering.

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. Students in upper division military science may select the dual-credit units in general areas from upper division

courses required by the School of Veterinary Medicine. Graduates with the D.V.M. degree may apply for direct commission in the United States Army Veterinary Corps.

General Military Science

For the general regulations concerning enrollment and the program in Military Science, see above.

Military Science

The University has an Army Reserve Officers' Training Corps unit that offers courses in general military science. The purpose of the program is to develop college educated officers for the United States Army and Reserve Components. It enables selected young men to prepare for positions of leadership in either a military or a civilian career of his choice. Enrollment in military science is on a voluntary basis. The United States Government furnishes arms, equipment, uniforms, and textbooks for the use of all students enrolled in courses of the department. Students enrolling in the first, second, or third year of Military Science (including students pre-enrolled) should, if on campus, report to the Department of Military Science during registration for issue of uniforms.

Lower Division

The lower division (basic) course is open to all first- and second-year undergraduate male students who are citizens of the United States, meet the required physical standards, and are under 23 years of age at the time of initial enrollment. The instruction is of a general type that prepares the cadet for entrance into upper division ROTC.

Upper Division

Application for admission to the upper division (advanced) course may be made by students who have successfully completed the basic course or who are eligible for equivalent credit and who can complete the course prior to their 28th birthday. It is also open to veterans having over one year of military service who meet the age and physical requirements.

To be accepted in the advanced course, an applicant must pass an entrance examination, a physical examination, be selected by the Professor of Military Science and the Chancellor, and execute an agreement with the government to complete the course which includes attendance at a six-week summer camp between the junior and senior years. Students selected for the advanced course are those who have shown potentialities for leadership and command and the promise of developing into efficient officers.

Students are trained at summer camp in the evaluation and practical application of tactical, technical and administrative procedures with particular emphasis on individual participa-

tion, leadership development and the capability to function effectively in positions of significant responsibility. Each student is furnished uniforms and equipment, and receives \$240 and travel expenses to and from camp. Academic credit of five units for the six weeks of field training is granted by the University.

During the two-year period of the advanced course, the student will be paid a nominal commutation of subsistence in an amount prescribed by the Secretary of Army (currently \$50 per month).

During their senior year, outstanding students may be designated by the Chancellor and the Professor of Military Science as Distinguished Military Students. If their high records are maintained, they may be designated, upon graduation from the University, Distinguished Military Graduates. These cadets may then apply for direct commission in the Regular Army as Second Lieutenants.

Successful completion of the advanced ROTC course, and graduation from the University, qualifies the student for appointment as a Second Lieutenant in the United States Army Reserve.

Lower Division Courses

1A. Basic General Military Science (First Year). (1) I.

Lecture—1 hour; drill—1 hour. Prerequisite: meet enrollment criteria in General Regulations of the General Catalog. Individual weapons and marksmanship; assembly, disassembly, and functioning of the standard United States Army rifle; preliminary training in marksmanship and good shooting habits. Leadership laboratory. The Staff

1B. Basic General Military Science

(First Year). (1) II.

Lecture—1 hour; drill—1 hour. Prerequisite: course 1A or the equivalent. The theory of organization of the Army; history and organization of the ROTC. United States Army and national security: organization for national defense. Leadership laboratory. The Staff

1C. Basic General Military Science

(First Year). (1) III.

Lecture—1 hour; drill—1 hour. Prerequisite: course 1B or the equivalent. United States Army and national security (continued): missions and responsibilities of the Army as a part of the National Defense Team. Leadership laboratory. The Staff

20A. Basic General Military Science

The Staff

(Second Year). (2) I.

Lecture—2 hours; drill—1 hour. Prerequisite: course 1C. American military history: survey from origins of American Army to World War II; emphasis on factors which led to organizational, logistical, operational, and other patterns in our present Army; analysis based on the principles of war. Leadership laboratory.

The Staff



**20B. Basic General Military Science
(Second Year). (2) II.**

Lecture—2 hours; drill—1 hour. Prerequisite: course 20A. American military history (continued): World War II until the present. Counterinsurgency operations: orientation. Map and aerial photograph reading: basic principles to include terrain evaluation, marginal information, map symbols, methods of orientation, and grid references. Leadership laboratory. The Staff

**20C. Basic General Military Science
(Second Year). (2) III.**

Lecture—2 hours; drill—1 hour. Prerequisite: course 20B, or the equivalent. Map and aerial photograph reading (continued): review of military maps; elementary aerial photograph reading. Introduction to operations and basic tactics: basic military team; combat formations and patrolling; field fortifications; concealment and cover; techniques of fire; principles of combat. Leadership laboratory. The Staff

Upper Division Courses**130A. Advanced General Military Science
(First Year). (2) I.**

Lecture—2 hours; drill—1 hour. Prerequisite: acceptance into upper division ROTC program; completion of lower division courses, or the equivalent. Leadership: responsibilities and basic qualities of a leader; leadership objectives, traits, technique, principles; special problems of military leadership. Counterinsurgency operations: analysis of nature of the insurgency problem; role of the United States Government agencies. Leadership laboratory. Col. Kirkbride

**130B. Advanced General Military Science
(First Year). (3) II.**

Lecture—3 hours; drill—1 hour. Prerequisite: course 130A. Military teaching principles: techniques used in planning and presenting instruction; use of training aids; methods of instruction; student presentations. Branches of the Army: familiarization with their missions,

functions, and career patterns. Leadership laboratory. Maj. Meriaux

**130C. Advanced General Military Science
(First Year). (3) III.**

Lecture—3 hours; drill—1 hour. Prerequisite: course 130B. Communications: means and principles of signal communications; characteristics, operation, and maintenance of communications equipment. Small unit tactics: infantry organization; fundamentals of offensive and defensive combat and their application. Summer camp orientation. Leadership laboratory. , Maj. Meriaux

**140A. Advanced General Military Science
(Second Year). (3) I.**

Lecture—3 hours; drill—1 hour. Prerequisite: course 130C. Operations: command and staff, military intelligence, and training management. Logistics: supply and evacuation, troop movements, and motor transportation. Leadership laboratory. Maj. Hempstead

**140B. Advanced General Military Science
(Second Year). (3) II.**

Lecture—3 hours; drill—1 hour. Prerequisite: course 140A. Army administration: personnel records; correspondence; unit funds; duties of administrative personnel; and mess management. Military justice: basic concepts of military justice under the Uniform Code of Military Justice and the Manual for Court-Martial, United States, 1951. Leadership laboratory. Maj. Hempstead

**140C. Advanced General Military Science
(Second Year). (2) III.**

Lecture—2 hours; drill—1 hour. Prerequisite: course 140B. Role of the United States in world affairs: evaluation of the principal political subdivisions of the world. Service orientation: customs of the service; responsibilities and obligations of an officer. Map review: principles and techniques of map reading. Leadership laboratory. Maj. Hempstead

MUSIC

Richard G. Swift, M.A., *Chairman of the Department*
Department Office, Music Building

Professors:

Jerome W. Rosen, M.A.
Richard G. Swift, M.A.

Associate Professors:

Larry D. Austin, M.M.
Theodore C. Karp, Ph.D.

Assistant Professors:

Robert S. Bloch, M.A.
Sydney R. Charles, Ph.D.

**Lecturers:**

Arthur N. Woodbury, M.M.

Major Subject Advisers. Mr. Bloch, Mr. Swift.

The Major Program

Preparation for the major—required: first year, Music 1A–1B, Music 4A–4B–4C; second year, 5A–5B–5C and 21A–21B–21C. Beginning and transfer students must take an examination in piano playing. Those showing deficiencies will be required to take Music 405. 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 transferring from other colleges should consult with departmental major advisers before enrolling in any music course.

The major—required: Music 104A–104B–104C and at least twenty units selected from the following courses: 105A–105B, 106, 108, 111, 112, 114, 115, 116, 117, 118, 119, 198, and 199. In addition, a total of at least 18 units in performance courses is required of all music majors. These courses include Music 30 (which may be satisfied by examination), 41, 42, 43, 44, 46, 130, 141, 142, 143, 144, 146.

Attention is called to the requirements in foreign languages for higher degrees in music: a reading knowledge of French or German for the M.A. degree in both composition and musicology. Undergraduates contemplating advanced study in music should prepare to satisfy these requirements as they proceed to the bachelor's degree.

Individual Group Major.—Individual group majors may be established by combining the work offered in this department with courses in allied fields. The major subject adviser should be consulted for details.

Graduate Study.—The Department of Music offers programs of study and research leading to the M.A. degree in composition or musicology. Detailed information regarding graduate study may be obtained from the Graduate Adviser for Music, Mr. Karp.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major. In addition, teaching methods courses (Music 321, 322, 323) are required.

Teaching Minor.—Required: Music 1A–1B (or 27A–27B), Music 4A–4B–4C; Music 5A–5B; Music 108; and either Music 111 or 112. In addition, students are advised to enroll in at least two quarters of performance courses. Students must consult with the subject representative.

Subject Representative: _____.

Lower Division Courses

1A–1B. Masterworks of Musical Literature.

(2–2) I–II.

Lecture—3 hours. Prerequisite: ability to read music; non-majors must obtain consent of the instructor. Introduction to styles and forms of music with guided listening to individual works. _____, Mr. Austin

4A–4B–4C. Elementary Theory. (4–4–4) I–II–III.

Lecture—4 hours. Fundamentals of music; ear-training; beginning tonal counterpoint and harmony. Mr. Swift, _____

5A–5B–5C. Intermediate Theory. (4–4–4) I–II–III.

Lecture—4 hours. Prerequisite: course 4C. Intermediate tonal counterpoint and harmony. Mr. Bloch

10. Basic Musicianship. (2) I, II, III.

Lecture—3 hours. Fundamentals of music, singing, ear-training, and conducting for the general student with emphasis upon classroom procedures for the primary grades.

The Staff (Mr. Woodbury in charge)

21A–21B–21C. History and Literature of Music.

(4–4–4) I–II–III.

Lecture—4 hours; laboratory—1 hour. Prerequisite: course 1B. The history of music from antiquity to the present. _____

27A. Introduction to Musical Literature. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Lectures, guided listening and readings designed to furnish the student with an understanding of basic music concepts. Intended primarily for non-majors.

Mr. Woodbury, Mr. Austin

27B. Introduction to Musical Literature. (4) II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 27A, or consent of the instructor. A survey of the history of musical styles from antiquity to the present. Lectures, guided listening and readings. Intended primarily for non-majors.

Mr. Austin, Mr. Woodbury

*30A–30B–30C. Applied Study of Music Literature: Intermediate. (1–1–2) I–II–III.

Class instruction in performance—2 hours. Prerequisite: consent of the instructor; student must demonstrate ability to perform scales and small compositions. Class instruction in individual wind, brass, string or keyboard instruments. Required for music majors; recommended for music minor. May be repeated once for credit. Non-majors and auditors not accepted.

The Staff (Mr. Austin in charge)

* Not to be given, 1968–69.

41. University Symphony. (2) I, II, III.

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 orchestra literature.

Mr. Bloch

42. Repertory Band. (2) I.

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 wind ensembles.

Mr. Woodbury

43. University Concert Band. (2) II, III.

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.

Mr. Austin, Mr. Woodbury

44. University Chorus. (2) I, II, III.

Rehearsal—4 hours. Prerequisite: admission subject to audition before first class meeting. Open to any student in the University. Rehearsals and performance of choral music.

Mr. Rosen

46. Chamber Music Ensemble. (2) I, II, III.

Rehearsal—3 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. Study, rehearsal, and performance of ensemble music for strings, winds, piano, harpsichord, and organ.

The Staff

Upper Division Courses**104A-104B-104C. Advanced Theory.**

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 5C. Strict composition: exercises in phrase and period structure.

Mr. Karp

105A-105B. Principles of Composition. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 104C. Elementary assignments in free composition.

Mr. Swift

***106. Fugue. (3) III.**

Lecture—3 hours. Prerequisite: course 104C.

Mr. Karp

***108. Instrumentation. (2) I.**

Lecture—2 hours. Prerequisite: course 5C or consent of instructor. A study of instruments of the orchestra, analysis of scores, and scoring for various instrumental combinations.

Mr. Woodbury

111. Choral Conducting. (2) III.

Lecture—2 hours. Prerequisite: course 5C. A study of the principles and techniques of conducting choral ensembles.

Mr. Rosen

***112. Instrumental Conducting. (2) II.**

Lecture—2 hours. Prerequisite: course 108. A study of the principles and techniques of conducting instrumental ensembles.

Mr. Woodbury

114. Music of the Middle Ages. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the middle ages.

Mr. Karp

***115. Music of the Renaissance. (4) I.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the period from 1430-1600.

***116. Music of the Baroque Period. (4) III.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the period from Monteverdi to Handel and J. S. Bach.

***117. Music of the Classic Period. (4) II.**

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the eighteenth century.

118. Music of the Romantic Period. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the nineteenth century.

119. Music of the Twentieth Century. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 21C. Studies in the music and styles of the twentieth century.

Mr. Austin

127A. Musical Literature: The Opera. (3) I.

Lecture—3 hours. Prerequisite: course 27B, or consent of the instructor. A study of selected operas such as Monteverdi's *Orfeo*, Mozart's *Don Giovanni*, Wagner's *Tristan und Isolde*, Verdi's *Otello*, Debussy's *Pélleas et Mélisande*, and Berg's *Wozzeck*. Intended primarily for non-majors.

***127B. Musical Literature: The Symphony. (3) III.**

Lecture—3 hours. Prerequisite: course 27B or consent of the instructor. A study of selected symphonies by composers such as Haydn, Mozart, Beethoven, Schubert, Brahms, and Stravinsky, emphasizing form and style. Intended primarily for non-majors.

Mr. Woodbury

130A-130B-130C. Applied Study of Music*Literature: Advanced. (1-1-2) I-II-III.**

Class instruction in performance—2 hours. Prerequisite: Music 30C, consent of instructor. Advanced class instruction in individual wind, brass, string or keyboard instruments. To complete the course students must perform in public concert or before faculty examination board. Non-majors and auditors not accepted. May be repeated once for credit.

The Staff (Mr. Austin in charge)

* Not to be given, 1968-69.

141. University Symphony. (2) I, II, III.

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 orchestra literature.

Mr. Bloch

142. Repertory Band. (2) I.

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 wind ensembles.

Mr. Woodbury

143. University Concert Band. (2) II, III.

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.

Mr. Austin, Mr. Woodbury

144. University Chorus. (2) I, II, III.

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.

Mr. Rosen

146. Chamber Music Ensemble. (2) I, II, III.

Rehearsal—3 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. Study, rehearsal, and performance of ensemble music for strings, winds, piano, harpsichord, and organ.

The Staff

198. Directed Group Study. (1-5) II.

Prerequisite: consent of the instructor.

The Staff (Mr. Swift in charge)

199. Special Study for Advanced Undergraduates.

(2-4) I, II, III.

The Staff (Mr. Swift in charge)

Graduate Courses***200A-200B-200C. Introduction to Musicology.**

(3-3-3) I-II-III.

Seminar—3 hours. Bibliography, individual research problems, and a class problem.

Mrs. Charles

NEMATOLOGYMerlin W. Allen, Ph.D., *Chairman of the Department*

Department Office, 223 Hoagland Hall

Professors:

Merlin W. Allen, Ph.D.

Bert Lear, Ph.D.

Dewey J. Raski, Ph.D.



* Not to be given, 1968-69.

203A-203B-203C. Composition. (3-3-3) I-II-III.

Seminar—3 hours. Prerequisite: course 105B. Technical projects and free composition.

Mr. Swift

***210A-210B-210C. History of Notation.**

(3-3-3) I-II-III.

Seminar—3 hours.

Mr. Karp

240A-240B-240C. Techniques of Analysis.

(3-3-3) I-II-III.

Seminar—3 hours. Analysis and analytical techniques as applied to music of all historical style periods.

_____, Mr. Karp, Mr. Swift

***291A-291B-291C. Seminar: Topics in Music History. (3-3-3) I-II-III.**

Seminar—3 hours. Studies in selected areas of music history and theory.

299. Individual Study. (2-5) I, II, III.

Special studies and projects in musical composition or music history.

The Staff (Mr. Swift in charge)

Teaching Methods Courses**Instrumental Methods**

The courses in this series consider methods of teaching orchestra and band instruments, and include repertory and program planning for secondary schools. Each course may be repeated once for credit.

***321. Stringed Instruments. (2) I.**

Discussion—2 hours. Prerequisite: course 4C.

Mr. Bloch

***322. Brass Instruments. (2) II.**

Discussion—2 hours. Prerequisite: course 4C.

Mr. Austin

***323. Woodwind Instruments. (2) III.**

Discussion—2 hours. Prerequisite: course 4C.

Mr. Woodbury

Professional Course**405A-405B-405C. Elementary Piano.**

(1-1-1) I-II-III.

Laboratory—2 hours. Prerequisite: open to music majors and candidates for the general secondary credential with a minor in music.

8**Professor:**Richard W. Timm, Ph.D. (*Visiting*)**Lecturers:**

Benjamin F. Lownsbury, Ph.D.

Armand R. Maggenti, Ph.D.

David R. Viglierchio, Ph.D.

Upper Division Courses**100. General Plant Nematology. (4) I.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Biology 1 or 10. An introduction to the classification, morphology, biology, and control of the nematodes attacking cultivated crops.

Mr. Lownsbery

110. Introduction to Nematology. (2) II.

Lecture—2 hours. The relationship of nematodes to man's environment. Classification, morphology, ecology, distribution, and importance of nematodes occurring in water and soil and as parasites of plants and invertebrate animals.

Mr. Timm

130. Principles of Nematode Control. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 100. Recommended: Chemistry 8B; Mathematics 13. Principles and techniques used for derivation of data and their interpretation as the basis for control of plant parasitic nematodes. The biological, physical, and chemical factors influencing nematodes and their control are studied in laboratory and greenhouse. Some field trips required.

Mr. Lear

Graduate Courses***220. Principles and Techniques of Nematode Taxonomy and Morphology. (4) I.**

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.

Mr. Maggenti

222. Nematode Pathogenicity to Plants. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 100. Investigations of problems in proving nematode pathogenicity; the role of nematodes in plant disease.

Mr. Lownsbery

***225. Nematode Taxonomy and Comparative Morphology. (4) II.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 220. The taxonomy, morphology, and comparative morphology of soil, freshwater, and marine nematodes.

Mr. Allen

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff

299. Research. (1-9) I, II, III.

The Staff

NUTRITION—See Also Animal Sciences and Family and Consumer Sciences**NUTRITION (A Graduate Group)**Magnar Ronning, Ph.D., *Chairman of the Group*

Group Office, 234 Animal Science Building

Graduate Courses**290. Seminar. (1) I, II, III.**

Seminar—1 hour. Discussion and critical evaluation of advanced topics in nutrition research.

The Staff (Mr. Ronning in charge)

298. Group Study. (1-5) I, II, III.

Discussion—1-5 hours.

The Staff (Mr. Ronning in charge)

299. Research. (1-12) I, II, III.

The Staff

ORIENTAL LANGUAGES**(Department of Anthropology)**

Department Office, 331 Voorhies Hall

Associate Professor:

Benjamin E. Wallacker, Ph.D.

Assistant Professors:

Olof G. Lidin, Ph.D.

Eric S. Liu, Ph.D.

Bezalel Porten, Ph.D.

Lecturer:

Donald R. Vesper, M.A.

* Not to be given, 1968-69.

Lower Division Courses**1C-2C-3C. Elementary Modern Chinese.**

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Introduction to the standard or "National Language" (Kuo Yü) of China.

Mr. Liu

4C-5C-6C. Intermediate Modern Chinese.

(4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 3C. A continuation of 3C.

Mr. Liu

1H-2H-3H. Elementary Hebrew. (4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Grammar, translation, composition, and conversation; introduction to Biblical Hebrew. Student may concentrate on any aspect or phase of the language.

Mr. Porten

1HL-2HL-3HL. Elementary Hebrew. (1) I-II-III.

Laboratory—2 hours. Prerequisite: course 1H-2H-3H may be taken concurrently; and consent of instructor. Composition and grammatical drill.

Mr. Porten

4H-5H-6H. Intermediate Hebrew. (4-4-4) I-II-III.

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 3H. Selected study of texts from different periods of the Hebrew language; grammar review; composition; conversation. Student may concentrate on any aspect or phase of the language.

Mr. Porten

1J-2J-3J. Elementary Modern Japanese.**(4-4-4) I-II-III.**

Lecture—3 hours; laboratory—2 hours.

Mr. Lidin

4J-5J-6J. Intermediate Modern Japanese.**(4-4-4) I-II-III.**

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 3J. A continuation of 3J.

Mr. Lidin

***1T. Elementary Telugu. (4) I.**

Lecture—3 hours; laboratory—2 hours. Offered in odd-numbered years.

***20. Elementary Tamil. (4) I, II, III.**

Lecture—3 hours; laboratory—2 hours.

Upper Division Courses**100. Languages of Eastern Asia. (4) II.**

Lecture—3 hours; discussion—1 hour. A survey course on the nature and distribution of the main languages of Eastern Asia.

Mr. Wallacker

101. Classical Chinese. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 6C. Readings in selected texts. May be repeated twice for credit. Mr. Wallacker

112. Chinese Literature in Translation. (4) I.

Lecture—3 hours; discussion—1 hour. No knowledge of Chinese is required. Representative works—including classics, histories, belles-lettres, and fiction—in English translation.

Mr. Wallacker

123A. Chinese Grammar. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1C; or consent of instructor. Offered if sufficient students enroll.

Mr. Liu

123B. Chinese Grammar. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 123A. Offered if sufficient students enroll.

Mr. Liu

132. History of Japanese Literature. (4) II.

Lecture—3 hours; discussion—1 hour. From the beginning to modern times, with emphasis on Chinese, Buddhist, and Western influences.

Mr. Lidin

142. Civilization of Eastern Asia: Japan. (4) I.

Lecture—3 hours; discussion—1 hour. A broad survey of Japanese civilization dealing with cultural, literary, religious, and social developments.

Mr. Lidin

***146. The Dravidian Languages. (4) I.**

Lecture—3 hours; discussion—1 hour. Analysis of the structures and distribution of Dravidian languages. Offered in even-numbered years.

***147. The Micronesian Languages. (4) II.**

Lecture—3 hours; discussion—1 hour. Analysis of the structure, distribution and external relationships of the Micronesian languages.

150A. Ancient Israel. (4) I.

Lecture—3 hours; discussion—1 hour. The culture of Israel as reflected in the Bible and archaeological discoveries. Patriarchal period to the Judges.

Mr. Porten

150B. Ancient Israel. (4) II.

Lecture—3 hours; discussion—1 hour. The culture of Israel as reflected in the Bible and archaeological discoveries. Monarchy to Restoration.

Mr. Porten

***151A. Ancient Jewish Civilization. (4) II.**

Lecture—3 hours; discussion—1 hour. The culture of the Jews in Palestine and the Diaspora as reflected in the Apocrypha and Pseudepigraphy; Josephus; Dead Sea Scrolls; Philo; Tannaitic and classical sources; archaeological discoveries. Alexander to Herod.

Mr. Porten

***151B. Ancient Jewish Civilization. (4) III.**

Lecture—3 hours; discussion—1 hour. The culture of the Jews in Palestine and the Diaspora as reflected in the Apocrypha and Pseudepigraphy; Josephus; Dead Sea Scrolls; Philo; Tannaitic and classical sources; archaeological discoveries. Procurators to demise of Patriarchate.

Mr. Porten

199. Special Study for Advanced Undergraduates.**(1-3) I, II, III.**

The Staff

299. Research. (1-12) I, II, III.

Mr. Wallacker

* Not to be given, 1968-69.

PARK AND RECREATION ADMINISTRATION—See Resource Sciences

PATHOLOGY

Donald R. Cordy, D.V.M., Ph.D., *Chairman of the Department*
Department Office, 1221 Haring Hall

Professors:

Donald R. Cordy, D.V.M., Ph.D.
Peter C. Kennedy, D.V.M., Ph.D.
Jack E. Moulton, D.V.M., Ph.D.

Associate Professor:

Donald L. Dungworth, B.V.Sc., Ph.D.

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Assistant Professors:

David H. Gribble, D.V.M. (*Acting*)
William P. C. Richards, M.V.Sc., Ph.D.
(*Acting*)

Upper Division Courses

122A. Veterinary Pathology. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: second-year standing in the School of Veterinary Medicine or consent of instructor. The fundamental degenerative, vascular, and inflammatory processes, disturbances of cell growth, including oncology.

Mr. Cordy, Mr. Moulton

122B. Veterinary Pathology. (5) II.

Lecture—4 hours; laboratory—3 hours. Prerequisite: course 122A. Special pathology of organ systems and related communicable diseases. Messrs. Gribble, Kennedy, Moulton

122C. Veterinary Pathology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 122A. Special pathology of organ systems and related communicable diseases.

—, Mr. Richards

Graduate Courses

250A-250B-250C. Necropsy Laboratory. (1) I-II-III.

Laboratory—33 hours. Prerequisite: fourth-year standing in School of Veterinary Medicine. Supervised experience in necropsy diagnosis, including techniques and interpretation. The Staff

PHILOSOPHY

Marjorie Grene, Ph.D., *Chairman of the Department*

Professors:

Arthur Child, Ph.D.
Neal W. Gilbert, Ph.D.
Marjorie Grene, Ph.D.

Associate Professor:

William H. Bossart, Ph.D.

Assistant Professors:

Ronald A. Arbini, Ph.D.

280. Advanced Pathology. (4) III.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 122A-122B-122C. Selected topics in the pathology of non-neoplastic diseases. Mechanisms of disease and patterns of reaction are stressed. Offered in odd-numbered years.

Mr. Cordy, Mr. Kennedy

281. Necropsy and Surgical Pathology.

(1-4) I, II, III.

Discussion—1 hour; laboratory—32 hours. Prerequisite: course 250C. Responsible diagnostic casework. Performance of necropsies; slide reading and case reporting.

The Staff

***282. Tumor Pathology. (4) I.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 122A-122B-122C. The histogenesis, incidence, geographical distribution, etiology, transmission, immunity, host response, gross and microscopic structure, and metastasis of the neoplasms of domestic animals. Offered in odd-numbered years.

Mr. Dungworth, Mr. Moulton

290. Seminar in Veterinary Pathology. (1) I, II, III.

Seminar—1 hour.

The Staff

291. Histopathology Conference. (1) I, II, III.

Discussion—1 hour. Prerequisite: course 250C. Discussion of selected cases based on records and slides. Defense of diagnosis.

The Staff

298. Group Study. (1-4) I, II, III.

Prerequisite: course 122A-122B-122C. Group Study of advanced topics in pathology.

The Staff

299. Research in Veterinary Pathology.

(1-9) I, II, III (Summer).

The Staff

Joel I. Friedman, Ph.D.

John F. Malcolm, Ph.D.

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Visiting Professor:

Milic Capek, Ph.D.

^o Not to be given, 1968-69.

¹ Absent on leave, 1968-69.

² Absent on leave, fall quarter 1968.

Lecturer:

Fred R. Berger, M.A.

The Major Program

Lower Division Courses.—Required: courses 12 and 20A–20B–20C.

Upper Division Courses.—Required: 36 units of upper division courses in philosophy, selected with the approval of the departmental major adviser, Mr. Arbini.

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 Advisers, Mr. Bossart and Mr. Malcolm.

Lower Division Courses**6. Introduction to Philosophy. (4) I, II, III.**

Lecture—3 hours; discussion—1 hour. Political, aesthetic, religious, metaphysical, and other concerns of philosophy, as exemplified in major works from various periods.

Mr. Arbini, Mr. Berger, Mr. Malcolm

6F. Freshman Seminar in Philosophy. (4) I.

Seminar—4 hours. Prerequisite: consent of instructor. An intensive introduction to philosophical inquiry. Open only to freshmen with strong interest or background in philosophy.

Mr. Bossart

12. Introduction to Logic. (4) I, II.

Lecture—3 hours; discussion—1 hour. Principles of inference and definition for symbolic deductive systems; sentential connectives, quantifiers, classes and relations. Mr. Friedman

20A. History of Philosophy. (4) I.

Lecture—4 hours. A survey of Greek philosophy from the Pre-Socratics to Plotinus, with particular attention to Plato, Aristotle, Epicurus, the Stoics, and Scepticism. Mr. Malcolm

Mr. Malcom

20B. History of Philosophy. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 20A. The history of philosophy from Augustine to the late Middle Ages.

20C. History of Philosophy. (4) III.

Lecture—3 hours; discussion—1 hour. The development of early modern philosophy. Readings from Descartes, Hobbes, Spinoza, Leibniz, Locke, Berkeley, Hume, and Kant. Mr. Beal

Upper Division Courses**101. Metaphysics. (4) III.**

Lecture and discussion—3 hours. Recommended: courses 20A, 20B, 20C, or 151. A critical analysis of various theories of being.

Mr. Malcolm

102. Theory of Knowledge. (4) I.

Lecture and discussion—3 hours. Philosophical problems of perception and thought, memory and preognition, imagination, truth and error, belief and knowledge. Types of epistemology. Mrs. Greene

***103. Philosophy of Mind. (4) III.**

Lecture and 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. Offered in odd-numbered years. Mr. Arbini

***105. Philosophy of Religion. (4) I.**

Lecture and discussion—3 hours. Nature of religion; its relations to morality and institutions; sources, status, and kinds of religious knowledge; existence and nature of God; man's relations to the divine; significance of death; concepts of survival; relations of church and state.

107A. Philosophy of the Physical Sciences. (4) I.

Lecture-discussion—3 hours. Prerequisite: one philosophy course or a major in science. Introduction to the nature of scientific laws, theories, explanations, and models. Problems of causality, determinism and indeterminism, induction and probability. Mr. Friedman

107B. Philosophy of the Biological Sciences. (4) II.

Lecture-discussion—3 hours. The relation of the biological to the physical sciences; the nature of theories, explanations, and models in biology and psychology. Problems of taxonomy, ethology, and evolutionary theory. Mrs. Greene

107C. Philosophy of the Social Sciences. (4) III.

Lecture-discussion—3 hours. The nature of laws and explanations in the social sciences; their relation to mathematics and the physical sciences; the role of value judgments in the social sciences; theories of historical knowledge; theoretical problems of data-processing.

Mr. Berger

114. Ethics. (4) II.

Lecture-discussion—3 hours. Recommended: course 6 or 6F. Principles of intelligent conduct; their status and nature; how they are discovered, known, and proved; their relationships to the principles of art, science, and logic. Mr. Berger

117. Political Philosophy. (4) II.

Lecture and discussion—3 hours. Recommended: course 6 or 6F. Intensive examination of some central concepts of political thought such as the state, sovereignty, rights, obligation, freedom, law, authority, and responsibility. Offered in even-numbered years. Mr. Berger

* Not to be given, 1968–69.

123. Aesthetics. (4) II.

Lecture and discussion—3 hours. Recommended: a course in art or music, and a course in philosophy. 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. Mr. Beal

131. Philosophy of Logic. (4) II.

Lecture and discussion—4 hours. Prerequisite: course 12; or Mathematics 125. The nature of an axiomatic system: its formal development and the derivation of such properties as completeness and consistency. Philosophical interpretation of Gödel's Theorem. Discussion of such topics as necessity and possibility, descriptions, theory of types, and intuitionism. Mr. Friedman

***132. History of Logic. (4) III.**

Lecture and discussion—3 hours. Prerequisite: course 12; or Mathematics 125. Recommended: course 131. Aristotle's *Organon*; Stoic logic; medieval Terminist logic; Leibniz' universal calculus; the logical contributions of Boole, De Morgan, and Peirce; and Frege's general logic. The initiation of contemporary logic by Peano, and by Whitehead and Russell. Offered in odd-numbered years. Mr. Gilbert

133. Philosophy of Mathematics. (4) III.

Lecture-discussion—3 hours. Prerequisite: course 12 or a major in mathematics. The nature of mathematical theories; set theory and type theory as foundations for mathematics; logicism, intuitionism, and formalism; philosophical discussion of Gödel's theorems; and relations between pure and applied mathematics. Offered in even-numbered years. Mr. Friedman

137. Philosophy of Language. (4) III.

Lecture and discussion—3 hours. Recommended: course 20C or 156. Problems that arise from the consideration of natural and formalized languages. Such authors as Aristotle, Wittgenstein, Austin, Carnap, Quine, and Ziff, and their contributions to semantic analysis. Mr. Arbini

***146. Renaissance Philosophy. (4) I.**

Lecture and discussion—3 hours. 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. Offered in even-numbered years. Mr. Gilbert

151. Philosophy of the Nineteenth Century. (4) II.

Lecture and discussion—3 hours. Recommended: courses 20A, 20B, or 20C. The idealism of Hegel, his contemporaries and his successors; Marxism; the positivism of Comte and Mill; the irrationalism of Kierkegaard and Nietzsche. Offered in even-numbered years. Mr. Bossart

155. American Philosophy. (4) II.

Lecture-discussion—3 hours. Recommended: course 6 or 6F. Study of such American thinkers as Peirce, James, Royce, Dewey, Santayana, Whitehead, and C. I. Lewis. Offered in odd-numbered years. Mr. Berger

156. Contemporary British Philosophy. (4) I.

Lecture and discussion—3 hours. Recommended: course 20C or 151. Interpretation and analysis of the most influential work of Bertrand Russell, G. E. Moore, Wittgenstein, J. L. Austin, and G. Ryle. Offered in even-numbered years. Mr. Arbini

157A. Contemporary European Philosophy. (4) II.

Lecture and discussion—3 hours. Recommended: course 20C, 151, or 175A, 175B. A study of contemporary directions in European philosophy, with particular attention to the development of phenomenology and *Existenzphilosophie* in Germany. Readings in Husserl, Heidegger, Jaspers, and related philosophers. Offered in even-numbered years. Mr. Bossart

157B. Contemporary European Philosophy. (4) III.

Lecture and discussion—3 hours. A study of contemporary directions in European philosophy, paying particular attention to the development of phenomenology and existentialism in France. Readings in Sartre, Marcel, Merleau-Ponty, and related philosophers. Offered in even-numbered years. Mr. Bossart

161. Plato. (4) I.

Lecture and discussion—3 hours. Offered in odd-numbered years. Mr. Malcolm

162. Aristotle. (4) I.

Lecture and discussion—3 hours. Prerequisite: course 20A; or consent of instructor. Offered in even-numbered years. Mr. Malcolm

169. Spinoza. (4) III.

Lecture and discussion—3 hours. Recommended: course 20C. Offered in odd-numbered years. Mrs. Greene

170. Leibniz. (4) I.

Lecture and discussion—3 hours. Recommended: course 20C. Offered in odd-numbered years. Mr. Gilbert

172. Locke. (4) II.

Lecture and discussion—3 hours. Offered in odd-numbered years. Mr. Arbini

174. Hume. (4) III.

Lecture and discussion—3 hours. Offered in even-numbered years. Mr. Child

* Not to be given, 1968-69.

175A. Kant. (4) I.

Lecture-discussion—3 hours. Prerequisite: course 20C. Offered in even-numbered years.

Mr. Bossart

175B. Kant. (4) II.

Lecture and discussion—3 hours. Prerequisite: course 20C. Offered in odd-numbered years.

Mr. Bossart

176. Hegel. (4) I.

Lecture and discussion—3 hours. Recommended: courses 20C, 175A, 175B. Offered in odd-numbered years.

Mr. Bossart

183. Russell. (4) I.

Lecture and discussion—3 hours. Recommended: course 12 or Mathematics 125. Offered in odd-numbered years.

Mr. Friedman

185. Founders of Modern Thought. (4) I.

Lecture and discussion—3 hours. Not open to philosophy majors or students who have had course 20C. A survey of modern philosophy from Descartes to Kant. Major emphasis upon problems still current today.

Mr. Beal

198. Directed Group Study. (1-5) I, II, III. The Staff**199. Special Study for Advanced Undergraduates.**

(1-5) I, II, III.

Prerequisite: consent of instructor. The Staff

Graduate Courses

Graduate courses 201, 202, and 214 are offered every year, by different instructors, and

may be repeated for credit with permission of the Graduate Adviser. The other graduate courses will be varied from year to year.

201. Metaphysics. (4) III.

Seminar—3 hours.

Mr. Bossart

202. Theory of Knowledge. (4) I.

Seminar—3 hours.

Mr. Arbini

***209. Theory of History. (4) II.**

Seminar—3 hours. Offered in odd-numbered years.

Mr. Child

214. Ethics. (4) I.

Seminar—3 hours.

Mr. Berger

223. Aesthetics. (4) II.

Seminar—3 hours. Offered in even-numbered years.

Mr. Child

261. Plato. (4) II.

Seminar—3 hours. Offered in odd-numbered years.

Mr. Malcolm

262. Aristotle. (4) III.

Seminar—3 hours. Offered in even-numbered years.

Mr. Malcolm

290. Seminar in the History of Philosophy.

(4) II.

Seminar—3 hours.

Mr. Bossart

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

PHYSICAL EDUCATION

Charles R. Kovacic, *Chairman of the Department*

Department Office, 264 Gymnasium

Professors:

Charles R. Kovacic, Ed.D.

¹Everett D. Ryan, Ed.D.

Associate Professors:

William L. Lakie, Ed.D.

Willard S. Lotter, Ed. D.

Mary Welch, Ed.D.

Assistant Professors:

William C. Adams, Ph.D.

¹Edmund M. Bernauer, Ph.D.

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Lecturer and Supervisor of Physical Education:

George A. Stromgren, M.S.

Supervisor:

Herbert A. Schmalenberger, M.A.

Associate Supervisors:

Robert R. Brooks, M.A.

Joseph E. Carlson, M.A.

Robert I. Hamilton, M.S.

Barbara J. Heller, Ed.D.

John W. Pappa, M.A.

Assistant Supervisors:

Jerry W. Hinsdale, A.B.

Judith L. Meyers, M.A.

James L. Sochor, M.A.

Phillip S. Swimley, M.A.

The incidental fee payable by all students at the time of registration, entitles students to the use of gymnasium, swimming pool, shower, towels, lockers, tennis courts, and the athletic fields. Certain equipment for games and sports

^{*} Not to be given, 1968-69.

¹ Absent on leave, 1968-69.

is available for exercise and recreation, either with or without instruction. Courses may be elected with or without academic credit. Lockers will be turned in on the last day of class, 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.

Major Advisers.—Mr. Adams, Mr. Bernauer, Mr. Kovacic, Mr. Lakie, Mr. Ryan, Miss Welch.

The Major Program

Students will specialize in one of two areas: biological aspects or psychological aspects of physical education.

Lower Division Courses.—Required of all students: Biology 1, Chemistry 1A, Mathematics 13, Physical Education 45, Physics 2A, Physiology 1, Psychology 1A, Zoology 102. Students interested in the biological aspects of physical education will be required to take Chemistry 8B and Zoology 2.

Upper Division Courses.—Required of all students: Physical Education 103, 104, 104L, 110, 120, and 135. Required of students in the biological area: Physiology 110A–110B and a minimum of 6 units selected from the following: Zoology 100, 100L, 106A, 106B, and Physiology 102. Required of students in the psychological area: Psychology 112 and three courses selected from one of the following groups: a) Psychology 108, 130, 134, 147A; b) Psychology 145, Sociology 152, 160.

Students who are preparing for careers as teachers will, in consultation with their adviser, elect additional physical education courses that satisfy requirements for the teaching credential.

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.

Lower Division Courses

1. Physical Education for Men. (½) I, II, III.

Laboratory—2 hours. Sections in archery, badminton, dance (social, folk and square), baseball, basketball, football, golf, trampolining, tumbling, wrestling, volleyball, handball, soccer, tennis, touch football, track, swimming. Men qualified for athletics may enroll in any sport pursued at Davis, such as baseball, basketball, football and receive credit. This course may be repeated for credit not to exceed a total of 6 units.

The Staff (Mr. Kovacic in charge)

5. First Aid. (2) I, II, III.

Lecture—2 hours. Standard course. Upon successful completion of the course the Red Cross Certificate is awarded.

Mr. Stromgren, Mr. Pappa, Mr. Swimley

10. Professional Physical Education Activities (Men). (1) I, II, III.

Lecture—1 hour; laboratory—2 hours. Fundamental knowledges and skills in swimming, basketball, football, track, baseball, tennis, golf, combative sports, developmental activities, court sports, tumbling and gymnastics.

The Staff (Mr. Kovacic in charge)

22. Professional Physical Education Activities (Women). (1) I, II, III.

Lecture—1 hour; laboratory—2 hours. Fundamental skills in aquatics (swimming—beginning, intermediate, advanced, synchronized; diving; lifesaving; water safety); archery; badminton; basketball; dance (folk and square, modern, social); tennis; track; tumbling; gymnastics; volleyball.

The Staff (Mr. Kovacic in charge)

25. The Theory of Lifesaving and Water Safety.

(1) I, II, III.

Lecture—1 hour; laboratory—2 hours. Prerequisite: course 1 or 26 and a course in intermediate swimming. Basic skills in swimming and small craft safety. Life saving procedures and techniques for which Red Cross Senior Lifesaving Certificate will be awarded upon successful completion of necessary requirements.

Mr. Hinsdale

26. Physical Education for Women. (½) I, II, III.

Laboratory—2 hours. Sections in archery, badminton, dance (modern, social, folk, and square), golf, tennis, trampolining, tumbling, volleyball, swimming. This course may be repeated for credit not to exceed a total of 6 units.

The Staff (Mr. Kovacic in charge)

27. Organization and Teaching of Recreational and Competitive Swimming and Diving Skills.

(1) I, II, III.

Lecture—1 hour; laboratory—2 hours. Prerequisite: Red Cross Lifesaving Certificate and Advanced Swimming and Diving. Organization and teaching of swimming and lifesaving skills. (Red Cross Water Safety instructors certificate awarded upon successful completion of necessary requirements.) Organization of competitive swimming and diving programs and coaching techniques.

Mr. Hinsdale

35. Rhythmic Form and Analysis. (1) I.

Lecture—1 hour; laboratory—2 hours. The fundamentals of rhythmic form, the use of rhythm as the basic element in activity and its application to physical education. A workshop class in the function of rhythm, form, and analysis.

*36A-36B. Dance History and Practice. (3-3) I-II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: body mechanics section of course 26

* Not to be given 1968-69.

(may be taken concurrently). A survey of the dance from its origins in prehistoric and antique ceremonial to 1900. A study of the materials, growth, and function of dance in society. Practice primarily in dance forms which developed out of Renaissance foundations.

***37A-37B. Contemporary Dance Theory and Practice. (3-3) I-II.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 36B. A study of the perspectives and practices of contemporary American art dance: traditional forms and twentieth-century innovation. A comparative study of selected theories and practices in America, Europe, and the Orient.

44. Principles of Healthful Living. (2) II.

Lecture—2 hours. Use of scientific information, proper attitudes, knowledge, and health practices in daily living.

Miss Heller

45. Foundations of Physical Education. (4) I, III.

Lecture—4 hours. Survey of the mode, development, expressive form, and objective of human movement.

Mr. Adams

Upper Division Courses

103. Analysis of Human Movement. (5) I.

Lecture—4 hours; laboratory—3 hours. Prerequisite: Physics 2A; Zoology 102. Anatomical and physiological concepts and physical laws as applied to human movement.

Mr. Kovacic

104. Physiology of Muscular Activity. (4) II.

Lecture—4 hours. Prerequisite: Biology 1; Physiology 2. Circulatory-respiratory and metabolic response to exercise in man under various physiological and ambient conditions.

104L. Physiology of Muscular Activity Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 104 to be taken concurrently. Laboratory in the systemic physiological response of man to exercise and physical stress.

110. Psychosocial Factors in Motor Performance. (4) III.

Lecture—3 hours. Prerequisite: Psychology 1A. Analysis of various psychological and social factors affecting the development and use of motor skills.

120. Sports in American Society. (4) II.

Lecture—4 hours. Prerequisite: History 17A. The interrelationships of sports with other aspects of society, including the family, church, school and government; consideration of the manner in which sports may be used to contribute to human welfare in our advanced technological society.

Mr. Lakie

* Not to be given, 1968-69.

130. Principles and Theory of Physical Education. (4) III.

Lecture—4 hours. A critical analysis of the assumptions underlying the physical education program.

Mr. Lakie

135. Research Design and Instrumentation in Physical Education. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 13. Methods, techniques, and design of experimental research in physical education.

140. Recreation in the Community. (3) II.

Lecture—3 hours. The nature, scope and significance of recreation with its implications for leisure. The development, organization, and purpose of public and voluntary agencies which serve the recreational needs of the community.

Mr. Lotter

145. School Health Education. (3) III.

Lecture—3 hours. Prerequisite: course 44; or consent of instructor. A study of the school health program as an integral part of the school curriculum; the underlying principles and functions of health instruction, health service, healthful school living and the contributing community health agencies.

Miss Heller

171. Conditioning of Athletes and Care of Injuries (Men). (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 5; Physiology 2; or Zoology 102. Modern principles and practices in conditioning and care of athletes. Prevention and care of athletic injuries; therapeutic exercises applied to athletic injuries; training room equipment, protective devices, and supplies.

Mr. Stromgren

180. Physical Education in the Secondary School. (3) I.

Lecture—3 hours. An analysis and study of the principles and methods basic to physical education in the secondary school.

Miss Meyers, Mr. Schmalenberger

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

Prerequisite: consent of department.
The Staff (Mr. Kovacic in charge)

Graduate Courses

200. Proseminar in Physical Education. (3) I, II, III.

Seminar—3 hours. Prerequisite: course 135. The meaning, methods, and techniques of research procedure as applied to physical education; a critical review of selected studies, literature, practices, and procedures in the field; application to a particular problem in the field.

Mr. Adams, Mr. Lotter

210. Historical and Cultural Bases of Physical Education. (3) I.

Lecture—2 hours; discussion—1 hour. Prerequisite: course 120. An examination of political, economic, social, and religious factors which have influenced sports in various countries and cultures.

Mr. Lakie

220. Kinesiology. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103. Critical review of current literature and research in kinesiology; neurophysiological concepts and physical laws.

Mr. Kovacic

221. Anthropometry in Relation to Physical Performance. (4) II.

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: courses 104 and 135. Consideration of growth, physical constitution, body proportions and body composition in man as they affect physical performance; measurement of selected structural and functional changes accompanying prolonged, systematic physical conditioning.

Mr. Adams

222. Metabolic Functions in Exercise. (4) III.

Lecture—2 hours; discussion—1 hour; laboratory—3 hours. Prerequisite: course 104, Physiology 110B. A 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 balance with particular reference to the effect of environmental conditions.

PHYSICAL SCIENCES

James H. Swinehart, Ph.D., Chairman of the Committee
Committee Office, 216 Chemistry

Committee in Charge:**Associate Professors:**Kurt Krieth, Ph.D. (*Mathematics*)William W. True, Ph.D. (*Physics*)^{2,3}James W. Valentine, Ph.D. (*Geology*)**Assistant Professors:**Joel I. Friedman, Ph.D. (*Philosophy*)James H. Swinehart, Ph.D. (*Chemistry*)**Lecturers:**

Mary F. Guest, Ph.D.

Sally Huff, Ph.D.

Major Adviser: See Schedule and Directory.

The major in physical sciences is designed primarily for students who wish to obtain a gen-

²Absent on leave, fall quarter, 1968.³Absent on leave, winter quarter, 1969.**230. Motor Performance: Psychological Aspects.** (4) II.

Lecture—2 hours; discussion—2 hours. Prerequisite: course 110. Critical review of current literature on motor learning; coordination; kinesiology; and reaction time; consideration of sensory-motor perception, motivation, and personality factors in relation to physical activities.

290. Physiological Basis of Physical Fitness. (2) III.

Seminar—2 hours. Prerequisite: graduate standing. Review and critical discussion of current research topics concerned with the physiological aspects of physical fitness.

299. Research. (1-12) I, II, III.

The Staff

Professional Courses**300. Physical Education Activities and Methods in the Elementary School.** (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: senior standing. Principles, theories, materials, and practices of the elementary school physical education program.

Mr. Adams

380A-380B. Methods of Physical Education in the Secondary School. (3-3) II-III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 180 and demonstrated competence in selected skills. The methods of teaching group and individual activities in the secondary school; program planning; class management; organization of the intramural and extramural programs.

Miss Meyers, Mr. Schmalenberger

eral secondary credential. The lower division course requirements are similar to those of the major in chemistry or physics. This major may lead to the Bachelor of Arts or the Bachelor of Science degree.

Preparation for the Major

Required: Chemistry 1A, 1B, 1C or 1A, 7A, 7B; Physics 4A, 4C, 4D, 4E; Geology 1, 1L; Mathematics 21A, 21B, 21C. Recommended: Chemistry 5; Physics 4B; Geology 4; Mathematics 2A, 2B. The choice of recommended courses will be governed by the field of specialization within the major.

The Major Program

A total of 36 units of upper division courses in the physical sciences, of which not less than 23 units must be taken in a single subject, e.g., chemistry, physics, or geology.

Teaching Major.—Requirements for the teaching major are the same as for the undergraduate major.

Teaching Minor.—The teaching minor must take at least 30 quarter units in two of the

physical science fields with at least 18 units in one of these two fields. The program must have the approval of the subject representative.

Subject Representative: Mr. Swinehart, Chemistry.

PHYSICS

James E. Draper, Ph.D., *Chairman of the Department*
Department Office, 141 Young Hall

Professors:

- James E. Draper, Ph.D.
- Milton E. Gardner, Ph.D. (*Emeritus*)
- Kenneth R. Greider, Ph.D.
- John A. Jungerman, Ph.D.
- William J. Knox, Ph.D.
- Charles G. Patten, Ph.D.

Associate Professors:

- Richard L. Lander, Ph.D.
- Douglas W. McColm, Ph.D.
- William W. True, Ph.D.

Assistant Professors:

- Franklin P. Brady, Ph.D.
- Thomas A. Cahill, Ph.D.
- Glen W. Erickson, Ph.D.
- Claude Garrod, Ph.D.
- James P. Hurley, Ph.D.
- Olaf S. Leifson, Ph.D.
- David E. Pellett, Ph.D.

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Lecturers:

- Natalie R. Leonard, B.A. (*Astronomy*)

Major Subject Advisers.—Mr. Brady, Mr. Erickson, Mr. Leifson, Mr. Hurley.

Bachelor of Arts Major Program

Lower Division Courses.—Required: Physics 4A, 4B, 4C, 4D, 4E; Chemistry 1A, 1B or 7A, 7B; Mathematics 21A, 21B, 21C, 22A, 22B, 22C. Recommended: A reading knowledge of French, German, or Russian.

Upper Division Courses.—Required: Physics 105A, 105B, 105C, 110A, 110B, 110C, 115A, either 116A or 122 (1 unit) or 122 (2 units); and additional units in upper division physics to make a total of at least 36 units.

Bachelor of Science Major Program

Lower Division Courses.—Required: Physics 4A, 4B, 4C, 4D, 4E; Chemistry 1A and either 1B-1C or 7A-7B; Mathematics 21A, 21B, 21C, 22A, 22B, 22C. Recommended: A reading

knowledge of two of the following languages: French, German, or Russian.

Upper Division Courses.—Required: Physics 104A, 104B, 105A, 105B, 105C, 108 or 112A, 112B, 110A, 110B, 110C, 115A, 115B, 116A, 116B, 122, 129A, 129B, 140. Recommended: Mathematics 150A, 150B, 185.

Honors and Honors Program.—The honors program in physics consists of 4 units of course 194H, open to seniors who qualify for the honors program. Students may be graduated with honors in physics on completion of the required major and this program.

Graduate Study.—The Department of Physics offers programs of study and research leading to the M.A. and Ph.D. degrees.

Lower Division Courses

Physics 4A, 4B, 4C, 4D, and 4E are for students whose major is physics and for students preparing for applications of physics in Engineering and Chemistry.

All students planning to take lower division courses (except course 10) should have completed trigonometry.

The Physics 2 series may be started in any quarter and completed without interruption since either sequence, 2A, 2B, 2C or 2A, 2C, 2B, is satisfactory. Also, 2B and 2C may be taken concurrently.

The Physics 4 series may be started in either winter or spring quarter and completed without interruption since either sequence, 4A, 4B, 4C, 4D, 4E or 4A, 4C, 4D, 4B, 4E, is satisfactory.

Upper Division Courses

Courses 4A, 4B, 4C, 4D, 4E, or their equivalent, and Mathematics 21A, 21B, and 21C are prerequisite to all upper division courses except course 107; in addition, Mathematics 22A, 22B, 22C or their equivalents are recommended. Some prerequisites may be waived with consent of the instructor.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major for degree (A.B. or B.S.).

Teaching Minor.—The teaching minor must take Physics 4A, 4B, 4C, 4D, 4E, and any other upper division physics courses necessary to complete 30 quarter units.

Subject Representative: Mr. Patten.

Astronomy

Lower Division Courses

1A. Introduction to General Astronomy: The Solar System. (4) II.

Lecture—4 hours. Introduction to the celestial sphere, constellations of the seasons, effects of diurnal and annual motions of the earth; planetary motions, phases and configurations, including study of earth as planet. Not intended for advanced physical science majors. (Courses 1A and 1B may be taken in either order.)

Mrs. Leonard

1B. Introduction to General Astronomy: Stars and the Universe. (4) III.

Lecture—4 hours. Introduction to stellar motions, magnitudes and distances; distribution of stars in space; the sun; the galaxy. Not intended for advanced physical science majors. (Courses 1A and 1B may be taken in either order.)

Mrs. Leonard

Physics

Lower Division Courses

2A. General Physics Lecture. (3) I, II, III.

Lecture—3 hours. Mechanics; introduction to electricity and magnetism.

I. Mr. Garrod, II. Mr. Erickson, III. Mr. Hurley

2B. General Physics Lecture. (3) II, III.

Lecture—3 hours. Prerequisite: course 2A. Electricity and magnetism, heat, kinetic theory, and thermodynamics.

II. —, III. —

2C. General Physics Lectures. (3) I, III.

Lecture—3 hours. Prerequisite: course 2A. Wave motion, optics, modern physics.

I. —, III. —

3A. General Physics Laboratory. (1) I, II, III.

Laboratory—3 hours. Prerequisite: course 2A (may be taken concurrently). Mechanics, introduction to electricity and magnetism. Experimental work planned to accompany the lectures in course 2A. Recommended for all students who elect course 2A.

I. Mr. Garrod, II. Mr. Erickson, III. Mr. Hurley

3B. General Physics Laboratory. (1) II, III.

Laboratory—3 hours. Prerequisite: course 2B (may be taken concurrently). Electricity and magnetism, heat, kinetic theory, and thermodynamics. Experimental work planned to accompany the lectures in course 2B. Recommended for all students who elect course 2B.

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3C. General Physics Laboratory. (1) I, III.

Laboratory—3 hours. Prerequisite: course 2C (may be taken concurrently). Wave motion, optics, modern physics. Experimental work planned to accompany the lectures in course 2C. Recommended for all students who elect course 2C.

4A. General Physics. (4) II, III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 21B (may be taken concurrently). Mechanics.

II. Mr. Greider, III. —

4B. General Physics. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4A; Mathematics 21C (may be taken concurrently). Properties of matter, special relativity, heat, kinetic theory, and thermodynamics.

Mr. Greider

4C. General Physics. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4A; Mathematics 21C; Mathematics 22A recommended. Electricity and magnetism.

Mr. Greider

4D. General Physics. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4C; Mathematics 22B recommended. A.C. circuitry, wave motions, and electromagnetic waves.

Mr. Leifson

4E. General Physics. (4) I, III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4D. Quantum and statistical physics.

Mr. Dodd

10. Basic Concepts of Physics. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: high school algebra. Survey of the basic principles of physics and how they have evolved since the time of Copernicus. Includes lecture-demonstrations and problem solving using elementary algebra.

Mr. Greider

11. The Relevance of Physics. (4) III.

Lecture—2 hours; discussion—2 hours. Prerequisite: consent of instructor. The mutual relations between physics and other disciplines in the humanities, natural sciences, social sciences and technology.

Mr. Greider

Upper Division Courses

104A-104B. Introduction to Methods of Mathematical Physics. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 4C; mathematics 22C. Elements of vector and tensor analysis, matrix methods, boundary value problems, integral transforms with applications to physics.

Mr. Erickson

105A-105B-105C. Analytical Mechanics.

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 4A; Mathematics 22C. Principles and applications of Newtonian mechanics.

107. Introduction to Electronics. (3) I.

Lecture—3 hours. Prerequisite: course 2B and calculus. Elementary principles of single-phase alternating-current circuits, characteristics of thermionic tubes and a study of simple electronic circuits. Not primarily intended for physics majors.

Mr. Patten

108. Physical Optics. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4E; Mathematics 22C. The phenomena of diffraction, interference, and polarization of light, and their applications.

Mr. Cahill

110A-110B-110C. Electricity and Magnetism.

(3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 4D; Mathematics 22C. Theory of electrostatics, electromagnetism, Maxwell's equations, electromagnetic waves.

Mr. Jungerman

112A-112B. Thermodynamics and Statistical Physics. (3-3) I-II.

Lecture—3 hours. Prerequisite: course 4; Mathematics 22C. Thermodynamics, kinetic theory, and introduction to statistical mechanics.

115A-115B. Introduction to Quantum Mechanics.

(3-3) I-II.

Lecture—3 hours. Prerequisite: courses 4E, 104B, 105B. The classical background, basic ideas, and methods of quantum mechanics, with applications to atomic physics.

Mr. Brady

116A. Electronic Instrumentation. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 4D; Mathematics 22C. Recommended: course 104B, partial differential equations and Laplace transforms. An experimental and theoretical study of important electronic circuits commonly used in physics.

Mr. Cahill

116B. Electronic Instrumentation. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 116A. Continuation of course 116A with special emphasis on recent developments in semiconductor circuitry.

Mr. Cahill

121. Foundations of Atomic and Molecular Physics.

(3) III.

Lecture—3 hours. Prerequisite: course 4E; 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.

122. Advanced Physics Laboratory. (1-2) II, III.

Laboratory—3-6 hours. Prerequisite: course 4. Experimental techniques and measurements in atomic, nuclear, and solid-state physics. May be repeated for credit not to exceed a total of 4 units.

II. Mr. Brady, Mr. McColm,

III. Mr. Leifson, Mr. Lander

129A. Nuclear Physics. (3) II.

Lecture—3 hours. Prerequisite: course 4E; Mathematics 22C. Survey of basic nuclear properties and concepts requiring only rudimentary knowledge of quantum mechanics.

Mr. Pellett

129B. Nuclear Physics. (3) III.

Lecture—3 hours. Prerequisite: courses 115B, 129A. Continuation of course 129A.

Mr. Brady

140. Introduction to Solid-State Physics. (4) III.

Lecture—4 hours. Prerequisite: course 115A. A survey of the properties of solids. Types of crystals, mechanical properties, lattice vibrations; thermal, electrical, and magnetic properties of metals and non-metals; band theory of solids; semiconductors; ferromagnetism.

Mr. Leifson

194H. Special Study for Honors Students.

(4) I, II, III.

Prerequisite: open only to seniors who qualify for the honors program. Independent research and/or reading on selected topics.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**205A-205B. Theoretical Mechanics. (3-3) I, II.**

Lecture—3 hours. Prerequisite: course 105C. I. The generalized methods of Lagrange and Hamilton. II. Hamilton and Jacobi theory; the formulation of quantum mechanics.

Mr. McColm

210A. Theory of Electricity and Magnetism. (3) III.

Lecture—3 hours. Prerequisite: course 110C; a course in differential equations. Classical description of static electromagnetic fields with emphasis on boundary value problems.

Mr. Garrod

210B. Theory of Electricity and Magnetism. (3) I.

Lecture—3 hours. Prerequisite: course 210A. Maxwell's equations, conservation laws, plane waves.

210C. Theory of Electricity and Magnetism. (3) II.

Lecture—3 hours. Prerequisite: course 210B. Special theory of relativity, covariant formulation of electromagnetic theory, radiating systems, and electron theory.

215A. Quantum Mechanics. (3) I.

Lecture—3 hours. Prerequisite: course 115B. Non-relativistic 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.

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.

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.

Lecture—3 hours. Prerequisite: courses 112B and 115B. Foundations of classical and quantum statistical mechanics. Mr. Hurley

219B. Statistical Mechanics. (3) II.

Lecture—3 hours. Prerequisite: course 219A. Applications to properties of solids, real gases, nuclear matter, fluctuations about the equilibrium state. Mr. Hurley

221A-221B-221C. Atomic Physics. (3-3-3) I-II-III.

Lecture—3 hours. Prerequisite: course 215C. 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. Mr. Leifson, Mr. McColm

224A. Nuclear Physics. (3) I.

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. Mr. Draper

224B. Nuclear Physics. (3) II.

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. Mr. Draper

224C. Nuclear Physics. (3) III.

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. Mr. Draper

229A. Advanced Nuclear Theory. (3) I.

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.

229B. Advanced Nuclear Theory. (3) II.

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.

230A. Quantum Theory of Fields. (3) I.

Lecture—3 hours. Prerequisite: course 215C. Relativistic quantum mechanics of particles; techniques and applications of second quantization; Feynman diagrams; renormalization. Mr. Erickson

230B. Quantum Theory of Fields. (3) II.

Lecture—3 hours. Prerequisite: course 230A. Continuation of 230B, with selected advanced topics, such as S-matrix theory, dispersion relations, axiomatic formulations. Mr. Erickson

239A. Quantum Many-Body Systems. (3) III.

Lecture—3 hours. Prerequisite: courses 215C and 219B. The quantum theory of many-particle systems. Theoretical analysis of superfluids, superconductors, and nuclear matter. Mr. Garrod

***239B. Quantum Many-Body Systems. (3) I.**

Lecture—3 hours. Prerequisite: course 239A. Perturbation and variation techniques in many-particle systems. Band theory of solids, electron-phonon interactions, and other topics. Mr. Garrod

***242A. Plasma Physics. (3) III.**

Lecture—3 hours. Prerequisite: course 210C. Recommended: course 219B. Motion of charged particles in electromagnetic fields, macroscopic equations, and plasma oscillations. Offered in odd-numbered years. Mr. Hurley

242B. Plasma Physics. (3) I.

Lecture—3 hours. Prerequisite: course 242A. Boundary layer problems, diffusion and stability. Offered in odd-numbered years. Mr. Hurley

***245A-245B. High Energy Physics. (3-3) I-II.**

Lecture—3 hours. Prerequisite: course 215A. Systematics of elementary particle interactions; determination of quantum numbers; interpretation of experiments; selected special topics in second quarter. Mr. Lander

290. Seminar. (1-3) I, II, III.

Seminar—1-3 hours. The Staff

291. Seminar in Nuclear Physics. (1-2) I, II, III.

The Staff

292. Seminar in Theoretical Physics. (1-2) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

* Not to be given, 1968-69.

PYSIOLOGICAL SCIENCES

Robert E. Smith, Ph.D., *Chairman of the Department*
Department Office, 2165 Haring Hall

Professors:

- Arthur L. Black, Ph.D.
- Leo K. Bustad, D.V.M., Ph.D.
- Stuart A. Peoples, M.D.
- Leon H. Schmidt, Ph.D.
- Robert E. Smith, Ph.D.

Associate Professors:

- Victor W. Burns, Ph.D.
- Richard A. Freedland, Ph.D.
- Alfred A. Heusner, Ph.D.
- *Harold R. Parker, D.V.M., Ph.D.

Assistant Professor:

- Quinton R. Rogers, Ph.D.

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Lecturers:

- Allen C. Andersen, V.M.D., Ph.D.
- Gaylor M. Conzelman, Ph.D.
- Rocco J. Della Rosa, Ph.D.
- Shri Giri, Ph.D.
- Marvin Goldman, Ph.D.
- Mary F. Guest, Ph.D.
- Sally Huff, Ph.D.
- Ethelda N. Sassenrath, Ph.D.

Upper Division Courses

101A-101B. Physiological Chemistry. (4-3) I, II.

Lecture—4-3 hours. Prerequisite: quantitative and organic chemistry. Recommended: a course in physiology (may be taken concurrently). 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; energy metabolism and nutrition.

Mr. Black, Mr. Freedland, Mr. Rogers

102A-102B. Physiological Chemistry Laboratory. (1-2) I-II.

Laboratory—3 hours. Prerequisite: course 101A-101B (should be taken concurrently). Laboratory practice to illustrate the chemical and physical properties of important constituents of animal cells including enzymes; blood and urine analysis; animal experiments on intermediary metabolism using isotopes.

Mr. Black, Mr. Freedland, Mr. Rogers

123. Comparative Pharmacology. (5) III.

Lecture—4 hours; laboratory—3 hours. Prerequisite: regular standing in the School of Veterinary Medicine or consent of the instructor.

¹ Absent on leave, 1968-69.

Medicine or consent of the instructor. The action of drugs on the physiological mechanisms of domestic animals.

Mr. Peoples, Mr. Giri

124. Comparative Pharmacology. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 123 or consent of the instructor. The effect of drugs on organ systems of domestic animals and their application to the treatment of disease. Laboratory exercises to illustrate the principles of therapeutics and toxicology.

Mr. Peoples, Mr. Schmidt

140A. Mammalian Physiology. (5) II.

Lecture—5 hours. Prerequisite: good standing in the School of Veterinary Medicine or consent of the instructor, based upon evidence of adequate preparation in mathematics and the physical and biological disciplines. A comprehensive survey of comparative mammalian physiology with emphasis on systemic mechanisms.

The Staff (Mr. Heusner in charge)

140B. Mammalian Physiology. (5) III.

Lecture—5 hours. Prerequisite: course 140A and good standing in the School of Veterinary Medicine or consent of the instructor, based upon evidence of adequate preparation in mathematics and the physical and biological disciplines. A comprehensive survey of comparative mammalian physiology with emphasis on systemic mechanisms.

The Staff (Mr. Heusner in charge)

141A. Laboratory in Mammalian Physiology. (2) II.

Laboratory—6 hours. Prerequisite: course 140A (may be taken concurrently). Non-veterinary students must receive consent of the instructor. Laboratory exercises designed to illustrate physiological interactions among systems in a variety of mammalian forms.

The Staff (Mr. Heusner in charge)

141B. Laboratory in Mammalian Physiology. (1) III.

Laboratory—3 hours. Prerequisite: courses 140B (may be taken concurrently), 141A. Non-veterinary students must receive consent of the instructor. Laboratory exercises designed to illustrate physiological interactions among systems in a variety of mammalian forms.

The Staff (Mr. Heusner in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

The Staff

Graduate Courses

205A. Intermediary Metabolism of Animals. (3) I.

Lecture—3 hours. Prerequisite: biochemistry and physiology or consent of the instructor. Gen-

eral considerations in use of biochemical data as related to metabolism of intact animals. Pathways and control in biosynthesis and degradation of carbohydrates and lipids; including hormonal, nutritional, and genetic effects. Dynamics of animal metabolism including pools and turnover rates.

Mr. Black, Mr. Freedland, Mr. Rogers

205B. Intermediary Metabolism of Animals. (3) II.

Lecture—3 hours. Prerequisite: 205A or consent of the instructor. Pathways and control in animals of the biosynthesis and degradation of amino acids, proteins, nucleotides and porphyrins; including hormonal, nutritional, and genetic effects. Mr. Black, Mr. Freedland, Mr. Rogers

225. Fundamentals of Radiation Biology. (5) I.

Lecture—5 hours. Prerequisite: one year of physics, introductory biochemistry, introductory physiology. Recommended: first course in analytical geometry and calculus. A survey of effects of ionizing radiations on biological systems, with emphasis upon mammals. Special problems of radiological physics, radiation chemistry, physiology, pathology and radioactivity in the biosphere are studied.

Radiation Biology Staff (Mr. Bustad in charge)

243A-243B. Use of Isotopes as Tracers in Biological Research. (2-2) I-II.

Lecture—2 hours. Prerequisite: biochemistry or physiological chemistry, elementary physics and calculus or permission of instructor. Discuss-

sion of the properties of isotopes and their use as tracers in biological systems. Mr. Burns

243L. Laboratory in Use of Isotopes as Tracers in Biological Research. (2) II.

Laboratory—6 hours. Prerequisite: courses 243A and 243B concurrently and consent of the instructor. Study of radioisotope properties, uses and measurement methods relevant to the biological sciences. Mr. Burns

255. Pharmacogenetics. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: consent of instructors. The genetic basis of interspecific and intraspecific differences in animals to the action of drugs. The laboratory exercises are designed to illustrate these differences and their biological basis.

Mr. Peoples, Mr. Stormont

***265. Experimental Physiology. (3) I.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: consent of the instructor. Selected lectures and experiments on cardiovascular, renal and pulmonary mechanisms with emphasis on chronically maintained preparations and perinatal problems. Offered in odd-numbered years.

Mr. Parker

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff

298. Group Study. (1-4) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

PHYSIOLOGY—See Animal Sciences, and Zoology

PLANT NUTRITION—See Resource Sciences

PLANT PATHOLOGY—See Plant Sciences

PLANT SCIENCES

Dillon S. Brown, Ph.D., *Chairman of the Committee*
Committee Office, 1043 Wickson Hall

Committee in Charge:

Robert W. Allard, Ph.D.
(Agronomy and Genetics)

Floyd M. Ashton, Ph.D. (*Botany*)

Dillon S. Brown, Ph.D. (*Pomology*)

James A. Cook, Ph.D. (*Viticulture and
Enology*)

Harry C. Kohl, Jr., Ph.D. (*Environmental
Horticulture*)

Lysle D. Leach, Ph.D., *Emeritus (Plant
Pathology)*

Oscar A. Lorenz, Ph.D. (*Vegetable Crops*)
R. Merton Love, Ph.D. (*Agronomy*)

° Not to be given, 1968-69.

Participating Departments:**AGRONOMY**

R. Merton Love, Ph.D., *Chairman of the Department*
 Department Office, 131 Hunt Hall

Professors:

- Fredrick T. Addicott, Ph.D.
- Robert W. Allard, Ph.D. (*Agronomy and Genetics*)
- John P. Conrad, Ph.D. (*Emeritus*)
- Paulden F. Knowles, Ph.D.
- ^aHorton M. Laude, Ph.D.
- R. Merton Love, Ph.D.
- Ben A. Madson, B.S.A. (*Emeritus*)
- Duaine S. Mikkelsen, Ph.D.
- Maurice L. Peterson, Ph.D.
- Charles W. Schaller, Ph.D.
- Francis L. Smith, Ph.D.
- Ernest H. Stanford, Ph.D.
- William A. Williams, Ph.D.
- Frederick P. Zscheile, Jr., Ph.D.

Associate Professor:

- Robert S. Loomis, Ph.D.

Assistant Professor:

- Calvin O. Qualset, Ph.D.

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Lecturers:

- R. William Breidenbach, B.S.
- Beecher Crampton, M.A.
- Ray C. Huffaker, Ph.D.
- Subodh K. Jain, Ph.D.
- Milton B. Jones, Ph.D.
- Charles A. Raguse, Ph.D.
- Dale G. Smeltzer, Ph.D.
- C. H. E. Werkhoven, Ph.D.

ENVIRONMENTAL HORTICULTURE

Harry C. Kohl, Jr., Ph.D., *Chairman of the Department*
 Department Office, 166 Environmental Horticulture

Professors:

- Richard W. Harris, Ph.D.
- Anton M. Kofranek, Ph.D.
- Harry C. Kohl, Jr., Ph.D.

Assistant Professors:

- James A. Harding, Ph.D.
- Andrew T. Leiser, Ph.D.
- Jack L. Paul, Ph.D.

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Lecturers:

- Samuel J. Cullers, M.A.
- Robert D. Danielson, M.S.
- Leonard H. McVicar

PLANT PATHOLOGY

_____, *Chairman of the Department*
 Department Office, 354 Hutchison Hall

Professors:

- James E. DeVay, Ph.D.
- W. Harley English, Ph.D.
- ^bRaymond G. Grogan, Ph.D.
- William B. Hewitt, Ph.D.
- Byron R. Houston, Ph.D.
- Lysle D. Leach, Ph.D. (*Emeritus*)
- George Nyland, Ph.D.
- Edward E. Wilson, Ph.D. (*Emeritus*)

- Tsune Kosuge, Ph.D.

- Joseph M. Ogawa, Ph.D.
- Thomas A. Shalla, Ph.D.

Assistant Professors:

- Clarence I. Kado, Ph.D.
- Robert K. Webster, Ph.D.

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Lecturer:

- Robert J. Shepherd, Ph.D.

² Absent on leave, fall quarter 1968.

⁵ Sabbatical leave in residence, 1968-69.

POMOLOGY

Dillon S. Brown, Ph.D., *Chairman of the Department*
 Department Office, 1043 Wickson Hall

Professors:

- Frank W. Allen, M.S. (*Emeritus*)
- Royce S. Bringhurst, Ph.D.
- Dillon S. Brown, Ph.D.
- Lawrence L. Claypool, Ph.D.
- Julian C. Crane, Ph.D.
- Luther D. Davis, Ph.D., LL.D. (*Emeritus*)
- William H. Griggs, Ph.D.
- Carl J. Hansen, M.S. (*Emeritus*)
- ²^aHudson T. Hartmann, Ph.D.
- Claron O. Hesse, Ph.D.
- Edward C. Maxie, Ph.D.
- E. Louis Proebsting, Ph.D. (*Emeritus*)
- Warren P. Tufts, Ph.D. (*Emeritus*)

Associate Professor:

- Dale E. Kester, Ph.D.

Assistant Professor:

- Paul E. Hansche, Ph.D.

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Lecturers:

- Muriel V. Bradley, Ph.D.
- Robert M. Carlson, Ph.D.
- Peter B. Catlin, Ph.D.
- Allan A. Hewitt, Ph.D.
- Omund Lilleland, Ph.D. (*Emeritus*)
- George C. Martin, Ph.D.
- Roger J. Romani, Ph.D.
- Kay Ryugo, Ph.D.
- ¹Noel F. Sommer, Ph.D.
- Kiyoto Uriu, Ph.D.

VEGETABLE CROPS

Oscar A. Lorenz, Ph.D., *Chairman of the Department*
 Department Office, 150 Hunt Hall

Professors:

- Glen N. Davis, Ph.D.
- William J. Flocker, Ph.D.
- James F. Harrington, Ph.D.
- James E. Knott, Ph.D., Sc.D., (hon.c.)
(Emeritus)
- Oscar A. Lorenz, Ph.D.
- John H. MacGillivray, Ph.D. (*Emeritus*)
- Leonard L. Morris, Ph.D.
- Harlan K. Pratt, Ph.D.
- Charles M. Rick, Jr., Ph.D.
- Paul G. Smith, Ph.D.

Associate Professor:

- Arthur R. Spurr, Ph.D.

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Lecturers:

- Frederick D. Howard, Ph.D.
- Lawrence Rappaport, Ph.D.
- Masatoshi Yamaguchi, Ph.D.
- Shang Fa Yang, Ph.D.

VITICULTURE AND ENOLOGY

Harold W. Berg, M.S., *Chairman of the Department*
 Department Office, 1023 Wickson Hall

Professors:

- Maynard A. Amerine, Ph.D.
- Harold W. Berg, M.S.
- James A. Cook, Ph.D.
- James F. Guymon, Ph.D.
- Klayton E. Nelson, Ph.D.
- Harold P. Olmo, Ph.D.
- Robert J. Weaver, Ph.D.
- A. Dinsmoor Webb, Ph.D.
- Albert J. Winkler, Ph.D., LL.D. (*Emeritus*)

Associate Professor:

- Lloyd A. Lider, Ph.D.

Assistant Professor:

- Ralph E. Kunkee, Ph.D.

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Professors:

- Fredrick T. Addicott, Ph.D. (*Agronomy*)
- George L. Marsh, M.S. (*Food Science and Technology*)

¹ Absent on leave, 1968-69.

² Absent on leave, fall quarter 1968.

³ Absent on leave, winter quarter 1969.

Lecturers:

W. Mark Kliewer, Ph.D.
 Cornelius S. Ough, B.S.
 Vernon L. Singleton, Ph.D.

Major Advisers.—See *Schedule and Directory*
 Listing.

Bachelor of Science Major Program and Graduate Study. See pages 81 and 133.

Plant Science**Lower Division Courses****1. Plants and Man. (3) II.**

Lecture—3 hours. Plants as a basic resource for food, fiber, shelter, and recreation; their use and effect on man, past, present, and future.

Mr. Harris, Mr. Smeltzer

2. Production of Cultivated Plants. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 1. Principles of crop improvement, propagation, production, processing, storage, and marketing; conservation and utilization of land and water resources.

Mr. Flocker, Mr. Lider

Upper Division Courses**101. Ecology of Cultivated Plants. (3) II.**

Lecture—3 hours. Prerequisite: course 2; Botany 111; Soil and Water Science 2. Plant population dynamics in cultivated ecosystems; the response of plant communities to light, temperature, soil, water, and air-pollution.

Mr. Loomis, Mr. Kohl

102. Physiology of Cultivated Plants. (3) III.

Lecture—3 hours. Prerequisite: Botany 111. Recommended: course 101. The plant as a dynamic unit; physiological processes in the vegetative growth, development, flowering and fruiting of cultivated plants.

Mr. Sachs, Mr. Rappaport

109. Principles of Plant Propagation. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2. Principles of propagating horticultural plants with emphasis on anatomical and physiological relationships. Mr. Hartmann

112. Postharvest Physiology and Handling of Horticultural Commodities. (3) I.

Lecture—3 hours. Prerequisite: Botany 111 or consent of instructor. Course 112L is recommended to be taken concurrently. Physiological processes related to the maturation and senescence of fruits and vegetables; fundamentals involved in handling, transportation, storage, and marketing practices, e.g., temperature and humidity control, protective treatments, controlled atmospheres.

Messrs. Claypool, Morris, Nelson

112L. Postharvest Physiology and Handling Laboratory. (2) I.

Discussion—1 hour; laboratory—3 hours. Prerequisite: course 112 (should be taken concurrently). Demonstrations and exercises following the subject matter of course 112. One or more field trips to observe commercial practices.

Messrs. Claypool, Morris, Nelson

113. Plant Breeding. (3) II.

Lecture—3 hours. Prerequisite: Genetics 100B. The principles of plant breeding.

Mr. Knowles, Mr. Hansche

116. Principles of Plant Nutrition. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Botany 111; Chemistry 5. 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; relation to animal nutrition; experimental techniques, including solution culture and radioactive tracing.

Mr. Epstein

120. Introduction to Weed Science. (2) II.

Lecture—2 hours. Prerequisite: Botany 2; Chemistry 8B. A general course covering the principles underlying the control of weeds.

Mr. Ashton

Agronomy**Lower Division Course****2. Forage Crops. (3) III.**

Lecture—2 hours; laboratory—3 hours. Adaptation, establishment, management, and utilization of forage plants as irrigated pasture, range, hay, and silage; aspects of forage quality which affect feeding value to livestock. Field trips will be arranged to observe developments in irrigated pasture management and range improvement.

Mr. Jones, Mr. Love

Upper Division Courses**100. Science and Technology of Field Crop Production. (3) I.**

Lecture—3 hours. Prerequisite: 9 units in plant science, botany and/or biology. Organization development, and application of science and technology for the solution of field crop production problems and for the advancement of field crops agriculture in the economy. Mr. Peterson

111. Small Grains, Corn, Sorghum and Beans. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 2, and 9 units of plant and/or soil and water science, or consent of instructor. Adaptation, distribution, culture, utilization, processing, and factors determining quality of wheat, oats, barley, rye, rice, corn, sorghum, and field beans.

Mr. Schaller

112. Forage Crop Ecology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 2, and 9 units of plant and/or soil and water science, or consent of instructor. Plant Science 101 recommended. 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. Mr. Raguse

113. Cotton, Sugar Beets, and Miscellaneous Crops.

(4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Botany 2 and 9 units of plant and/or soil and water science, or consent of instructor. Adaptation, distribution, culture, utilization, processing, and other factors determining quality of cotton and other fiber crops, sugar crops, oil crops, and miscellaneous crops. Mr. Mikkelsen

194H. Special Study for Honors Students.

(1–5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. Independent study, research and/or reading on selected topics under the direction of a member or members of the staff. Completion will involve the writing of a senior thesis. The Staff

198. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of the instructor.

The Staff

199. Special Study for Advanced Undergraduates.

(1–5) I, II, III.

Prerequisite: 6 upper division units of agronomy. The Staff

Graduate Courses**205. Design of Field Experiments. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Mathematics 105A. The planning and analysis of field and related experiments with emphasis on the biological interpretation of results. Mr. Qualset

206. Chemical and Physical Methods in Biological Research. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Chemistry 5 and 9. Advanced laboratory techniques and instrumental methods of analytical chemistry in biological research. Includes an introduction to laboratory research methods, preparation of samples, principles and operation of research instruments, and laboratory practice in methods of plant analysis.

Mr. Zscheile, Mr. Huffaker

221. Advanced Plant Breeding. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Science 113. Advanced topics

in plant breeding. Genetic diversity and centers of origin of cultivated plants, mating systems in plants, polyploidy, host-pathogen relationships, role of mutagens in plant breeding, and other topics of current interest. Mr. Stanford

222. Quantitative Genetics and Plant Improvement.

(4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Science 113; Genetics 105; or consent of instructor. The genetic forces affecting populations. Formulation of breeding plans based on principles of population and quantitative genetics. Offered in even-numbered years.

Mr. Allard

231. Advanced Topics in the Ecology of Crop**Plant Communities. (3) II.**

Lecture—3 hours. Prerequisite: Plant Science 101; or consent of instructor. Analytical models and quantitative description of the structure and dynamics of field crop communities in relation to interplant competition, population functions and environmental adaptation.

Mr. Laude

232. Advanced Topics in the Physiology of Crop**Plants. (3) I.**

Lecture—3 hours. Prerequisite: Plant Science 102; or consent of instructor. Physiological aspects of vegetative and reproductive growth of field crop plants in relation to their field behavior.

Mr. Huffaker

290. Seminar. (1) I, II, III.

Seminar—1 hour.

Mr. Knowles

298. Group Study. (1–3) I, II, III.

Directed study in the areas of plant physiology, plant genetics, plant bio-chemistry, agricultural chemistry, or soil-plant relationships of field crops or range and pasture plants.

The Staff

299. Research. (1–9) I, II, III.

Original research involving plant physiology, plant genetics, plant bio-chemistry, agricultural chemistry, or soil-plant relationships of field crops or range and pasture plants.

The Staff

Environmental Horticulture**Lower Division Courses****1. Introduction to Landscape Design. (3) II.**

Lecture—3 hours. Recommended for non-majors. Design principles and criteria used in analyzing, evaluating, and developing the visual and functional aspects of landscaped areas.

Mr. Danielson

1L. Introduction to Landscape Design Laboratory.

(2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 1 (may be taken concurrent-

ly); recommended for non-majors. Practice in analysis and design with reference to landscape problems.

Mr. Danielson

2. Elements of Landscape Design. (3) III.

Lecture—1 hour; laboratory—6 hours. Prerequisite: courses 1 and 1L; recommended for non-majors. Analysis and solution of typical site problems related to land development.

Mr. Danielson

5. Introduction to Environmental Plants. (2) I.

Lecture—1 hour; laboratory—3 hours. Recommended for non-majors. The course introduces plants commonly used in the landscape. The origin, domestication and breeding of cultivated plants is discussed. Students learn to identify the more important environmental plants of California.

Mr. Harding

6. Environmental Plants. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 5. Environmental plants are identified and their landscape use and adaptation studied. Techniques of identification and the bases of nomenclature are discussed.

Mr. Leiser

7. Environmental Plants. (2) III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 6. The use of environmental plants as related to elements of plant geography, ecology and design principles. Ornamental plants are identified with emphasis on herbaceous plants.

Mr. Madison, Mr. Danielson

10. Landscape Horticulture for the Home and Community. (3) III.

Lecture—2 hours; discussion—1 hour. Recommended for non-majors. The influences of climate, soil, and cultural practices on the growing of turf, flowers, and herbaceous and woody plants in the landscape.

Mr. Kofranek

47. Introduction to Environmental Horticulture.

(1) III. §§

Field Study—30 hours. Prerequisite: consent of instructor. An introduction to environmental horticulture including parks and recreation; landscape architecture; urban and resource planning; landscape construction and contracting; nursery production; commercial floriculture; arboriculture; sales and services; teaching, research and extension. Offered in odd-numbered years.

Mr. Harris

Upper Division Courses

104. Principles of Landscape Construction. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: courses 1 and 1L; Engineering 1 recommended. An analysis of landscape construction

§§ To be given between the winter and spring quarters. Considered a spring quarter course for preenrollment.

tion systems used in site design and development including a survey of construction techniques. Emphasis on physical structure rather than plant materials. Offered in even-numbered years.

Mr. Danielson

105A-105B-105C. Taxonomy and Ecology of Environmental Plants. (2-2-2) I-II-III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: course 7; or consent of instructor. The taxonomy, ecology and uses of environmental plants. Special emphasis will be placed on the solution of problems of variability and horticultural nomenclature, and on plants of importance in the West. Several field trips required.

Mr. Leiser

121. Analysis of Horticultural Problems. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 2; Soil and Water Science 2. Laboratory methods are used to analyze problems of environmental plant response resulting from water, soil fertility and other environmental factors or from cultural practices.

Mr. Paul

125. Floriculture and Nursery Management. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Plant Science 2 or Botany 2. Practices and principles in planning, establishing and maintaining container grown crops with special consideration of green house production. Several field trips required.

Mr. Kofranek, Mr. Hackett

128A. Advanced Landscape Horticulture. (2) I.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Plant Science 2 or Botany 2. Practices and principles in planning, establishing, and maintaining plantings in the landscape with emphasis on turf. Several field trips required.

Mr. Madison

128B. Landscape Horticulture. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Plant Science 2 or Botany 2. Practices and principles of planning, establishing, and maintaining plantings in the landscape with emphasis on trees and shrubs.

Mr. Harris

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. 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.

Mr. Danielson, Mr. Harris

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: 3 units of upper division work in environmental horticulture; consent of instructor. Selected problems in floriculture, nursery management, and landscape horticulture.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: 3 units of upper division work in landscape horticulture; consent of instructor.

The Staff

Graduate Courses**290. Seminar. (1) I, II, III.**

Seminar—1 hour. Selected topics in floriculture, nursery management, and landscape horticulture.

The Staff

298. Group Study. (1-6) I, II, III.

Group study on advanced topics in floriculture, nursery management, and landscape horticulture.

Mr. Sachs

299. Research. (1-6) I, II, III.

Prerequisite: graduate standing. Research in floriculture, nursery management, and landscape horticulture.

The Staff (Mr. Paul in charge)

Plant Pathology**Upper Division Courses****120. Introduction to Plant Pathology. (4) I, III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 2. Recommended: Bacteriology 2. The nature, cause, and control of plant diseases.

I. Mr. Campbell, III. Mr. English

122. Diagnostic Techniques. (3) II.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120. Elementary diagnostic techniques used in the study of plant diseases and their causal agents.

Mr. Nyland

***125. Diagnosis and Control of Plant Diseases.**

(4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 120. Clinical plant pathology with major emphasis given to the diagnosis and control of diseases affecting fruits, vegetables, field crops, and ornamentals. Frequent field trips are required.

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**202A-202B. Research Techniques in Plant Pathology. (3-3) II-III.**

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 120. Principles and practices of advanced techniques used in plant pathological research.

II. Mr. Nyland

III. Mr. Nyland, Mr. Shalla

202C. Research Techniques and Instrumentation.

(3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: course 202B; Chemistry 5. Laboratory

methods and techniques in plant pathology with emphasis upon instrumentation. Mr. Kosuge

205. Advanced Study of Field and Vegetable Crop Diseases. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 202A; Botany 119A. A clinical study of the factors affecting disease development and severity with emphasis on ecology and the techniques involved in diagnosis. Frequent field trips are required.

Mr. Houston, Mr. Shepherd

206. Advanced Study of Fruit and Nut Diseases.

(4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: course 202A; Botany 119A. A clinical study of the factors affecting initiation, development, and control of selected fungus, bacterial, and virus diseases of perennial fruit and nut plants. Frequent field trips are required.

Mr. Ogawa

***208. Principles of Plant Disease Control. (3) II.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 120. Economic importance of diseases; evaluation of losses; control by exclusion, eradication, immunization, therapy, and protection. Classes of fungicides and bactericides: their application, depositional characteristics, phytotoxicity, regulation, assay methods, and mechanisms of action.

210. Physiology of Plant Pathogens. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 202C; Biochemistry 101B. A study of the fundamental concepts and current information on the physiology of plant pathogens and host parasite relationships.

Mr. DeVay

215. Genetics of Plant Pathogens. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 120; Genetics 100B; Botany 119B. Study of fundamental concepts, research techniques and current information of the genetics of plant pathogenic microorganisms; origin and determination of physiologic specialization, host resistance and virulence in the pathogen as related to the host-parasite interaction. Special emphasis on the fungi.

Mr. Webster

224. Pathogenic Fungi. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 119B. Morphology and taxonomy of plant pathogenic fungi.

Mr. Butler

226. Plant Virology. (5) II.

Lecture—2 hours; laboratory—9 hours. Prerequisite: course 202C. Viruses as causal agents of plant diseases; chemical and physical properties of viruses; methods of transmission; procedures for assay and diagnosis; multiplication of

* Not to be given, 1968-69.

viruses; pathological cytology and anatomy; application of equipment and techniques used in research.

Mr. Shalla, Mr. Shepherd

235A-235B. Advanced Plant Pathology. (4-4) I-II.

Lecture—3 hours; discussion—3 hours. Prerequisite: consent of instructor. A study of the factors influencing pathogenicity and of the reaction of host plants to disease.

I. Mr. Hewitt, II. Mr. Grogan

290. Seminar. (1) I, II, III.

Seminar—1 hour.

I. Mr. English,

II. Mr. Butler, III. Mr. Ogawa

291. Seminar in Host-Parasite Physiology.

(1) I, II, III.

Seminar—1 hour. Prerequisite: course 120.
Mr. DeVay, Mr. Kosuge

298. Special Group Study. (1-4) I, II, III. The Staff

299. Research. (1-9) I, II, III. The Staff

Pomology

Lower Division Course

3. Citrus and Other Subtropical Fruits. (3) III.

Lecture—3 hours. The production of the subtropical fruits including avocados, dates, olives, and citrus with special emphasis on citrus. A study of the fundamental information relating to orchard management as applied to these fruits.

Mr. Hesse

Upper Division Courses

100A. Principles of Pomology. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2. Origin, history, distribution, and adaptation of fruit and nut plants; their structure and function in relation to environment and cultural practices.

Mr. Kester

100B. Principles of Pomology. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2. Development of the vegetative structure of fruit and nut plants; the physiological responses to environment and cultural modification.

Mr. Crane

100C. Principles of Pomology. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Botany 2. Flowering and fruiting; the nature and development of buds, flowers, and fruits in relation to the culture of fruit and nut plants and to their environment.

Mr. Griggs

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Hesse in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses

201. Biochemistry and Physiology of Fruits. (3) III.

Lecture—3 hours. Prerequisite: Biochemistry 101B; Botany 111; or consent of instructor. Biochemical and physiological phenomena of growth, maturation, ripening, and senescence of fruit. (Open to qualified undergraduates.)

Mr. Maxie

210. Fruit Morphology. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 2. The development of flower, fruit, and seed structures of representative fruit types.

Miss Bradley

216. Physiology of Fruit Plants. (4) II.

Lecture—4 hours. Prerequisite: courses 100A, 100B, 100C; Botany 111. Physiological processes in the growth and development of fruit plants; metabolic relationships; influence of environment and culture.

The Staff (Mr. Uriu in charge)

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff (Mr. Catlin in charge)

291. Seminar in Post-Harvest Physiology.

(1) I, II, III.

Seminar—1 hour. Prerequisite: consent of instructor. Selected topics in the field of post-harvest physiology of fruits and vegetables. Conducted jointly with Vegetable Crops 291.

Mr. Maxie

299. Research. (1-6) I, II, III. (Summer) The Staff

Vegetable Crops

Upper Division Courses

100. Principles of Vegetable Crops. (3) I.

Lecture—3 hours. Prerequisite: Plant Science 1 and 2; or consent of instructor. The vegetable industry. Fundamentals of vegetable crop production, handling, processing and utilization. Demonstrations will supplement the lecture.

Mr. Lorenz

101. Major Vegetable Crops. (4) II.

Lecture—4 hours. Prerequisite: Plant Science 1 and 2; or consent of instructor. Recommended: course 100. Adaptation, growth habits and methods of culture and handling of the principal vegetable crops. The application of experimental evidence to production problems is stressed.

Mr. Smith

105. Systematic Olericulture. (2) I.

Laboratory—6 hours. Prerequisite: Botany 2. Origin, history, types, classification, nomenclature, and adaptation of the more important American vegetable varieties; minor vegetable crops; trends in development of new varieties. One or more field trips.

Mr. Smith

118. Seed Physiology and Production. (3) II.

Lecture—3 hours. Prerequisite: Botany 111. Physiological factors affecting induction of seedling, seed development, viability and longevity of seed. Principles of seed production. One or more field trips.

Mr. Harrington

150. Vegetables as World Food Crops. (3) II.

Lecture—3 hours. Prerequisite: Botany 2; or consent of instructor. A technical course concerned with historical and current aspects of production and use of vegetables as human food; ecology, economics, geography, human cultural patterns, dietary preferences, nutritional values, and use of microclimates related to commercial and subsistence production.

190. Proseminar. (1) II.

Discussion—1 hour. Prerequisite: consent of instructor. Current problems and research in vegetable production.

Mr. Lorenz

197. Field Study of Vegetable Industry. (1) III.

Lecture—1 hour; field study—56 hours. Prerequisite: consent of instructor; limited to 25 students. A field study trip covering the major vegetable producing areas of California. Visits are made to packing sheds, seed companies, plant breeding industry, processors, vacuum coolers, mushroom plant, farmer operations, canneries, Los Angeles market, California Institute of Technology phytotron, etc.

Mr. Flocker

198. Directed Group Study. (1-5) I, II, III.

The Staff (Mr. Davis in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

The Staff

Graduate Courses**212. Postharvest Physiology of Vegetables. (4) III.**

Lecture—2 hours; laboratory—6 hours. Prerequisite: consent of instructor. Comparative physiology of harvested vegetables representing diverse plant structures; emphasis on experimental studies of maturation, compositional and morphological changes, senescence, and physiological disorders; lecture stresses species responses and requirements; laboratory stresses concepts and research procedures. Offered in alternate years.

Messrs. Morris and Pratt

220. Vegetable Genetics and Improvement. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 105; Genetics 100B; Plant Science 113 recommended. Breeding systems of vegetable species as affected by self-incompatibility, flower structure, pollen vectors, and other reproductive factors. Problems of chromosome number and structure, heterosis, pest resistance, and species hybrids peculiar to vegetable improvement.

Mr. Rick

221. Vegetable Physiology. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 111 and consent of instructor. Physiological principles involved in the production of vegetable crop species.

Mr. Pratt, Mr. Rappaport

290. Seminar. (1) I, II, III.

Discussion—1 hour.

The Staff (Mr. Spurr in charge)

291. Seminar in Postharvest Physiology. (1) I, II, III.

Discussion—1 hour. Prerequisite: consent of instructor. An intensive study of selected topics in the field of postharvest physiology of fruits and vegetables. This seminar will be conducted jointly with Pomology 291.

The Staff (Mr. Pratt in charge)

298. Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Current concepts, techniques, and procedures applicable to research and to the production of vegetables.

The Staff (Mr. Yamaguchi in charge)

299. Research. (1-9) I, II, III.

The Staff

Viticulture and Enology**Lower Division Course****3. Introduction to Wine Making. (3) II.**

Lecture—3 hours. An introduction to wine technology, including history, fermentation, production practices, wine types, and the wine industry of California and other wine producing areas.

Mr. Singleton, Mr. Amerine

Upper Division Courses**105. Systematic Viticulture Including Fruit Maturation and Handling. (3) I.**

Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 2; or consent of instructor. Botanical classification of the grape—the principal varieties, rootstocks, and species; environmental factors affecting maturity and quality of the fruit for raisins, wine and table grapes; raisin making; costs and returns.

Mr. Nelson, Mr. Lider

116A. General Viticulture. (3) II.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Plant Science 2; or consent of instructor. Principles underlying pruning, training, grafting, and propagation of vines; environmental and economic factors affecting choice of vineyard type and location; establishment of vineyards.

Mr. Cook

116B. General Viticulture. (3) III.

Lecture—2 hours; laboratory—3 hours. Prerequisite: course 116A. Economics and scientific principles of recommended vineyard manage-

ment practices including irrigation, mineral and carbohydrate nutrition, flower development and fruit set, virus and fungal diseases, and insect control.

Mr. Cook

190. Proseminar in Viticulture. (1) I.

Lecture—1 hour. Prerequisite: consent of instructor. Reports and discussions of recent advances in viticulture.

Mr. Olmo

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff (Mr. Berg in charge)

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff (Mr. Berg in charge)

Graduate Courses

208. Plant Hormones and Regulators. (3) I.

Lecture—3 hours. Prerequisite: Botany 111; Chemistry 8B; or consent of instructor. Open to qualified upper division students. History, occurrence, extraction, measurement, chemical nature, developmental and physiological effects, role, and theories of action of plant hormones and growth regulators; methods of application of growth regulators and factors altering effec-

tiveness; application in the control of plant and fruit responses.

Mr. Weaver, Mr. Addicott

208L. Plant Hormones and Regulators Laboratory. (2) I.

Laboratory—6 hours. Prerequisite: course 208 (may be taken concurrently); or consent of instructor. Experiments in plant hormones and regulators using various bioassay methods for auxins, gibberellins, and kinins; preparation and testing of gibberellic acid; extraction and identification of naturally occurring plant hormones.

Mr. Weaver

219. Plant Phenolics. (3) II.

Lecture—3 hours. Prerequisite: Biochemistry 101B or equivalent and approval 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.

Mr. Singleton

290. Seminar. (1) II.

Seminar—1 hour. Prerequisite: consent of instructor.

Mr. Webb

299. Research. (1-6) I, II, III.

The Staff

POLITICAL SCIENCE

Paul E. Zinner, Ph.D., *Chairman of the Department*

Department Office, 227 Voorhies Hall

Professors:

Richard W. Gable, Ph.D.
Charles M. Hardin, Ph.D.
Clyde E. Jacobs, Ph.D.
¹Lloyd D. Musolf, Ph.D.
Vernon J. Puryear, Ph.D.
Paul E. Zinner, Ph.D.

Associate Professors:

Alexander J. Groth, Ph.D.
John R. Owens, Ph.D.
Donald S. Rothchild, Ph.D.
Marvin Zetterbaum, Ph.D.

Assistant Professors:

Stanley B. Bernstein, Ph.D.
Edmond Costantini, Ph.D.
Alvin D. Sokolow, Ph.D.
William S. Tuohy, Ph.D.
Louis F. Weschler, M.A.
Kenneth I. Hanf, M.A. (*Acting*)

Lecturers:

Joyce K. Kallgren, M.A.
Larry Peterman, M.A.

Department Major Advisers.—Mr. Bernstein, Mr. Costantini, Mr. Gable, Mr. Hanf, Mrs. Kallgren, Mr. Sokolow, Mr. Tuohy, Mr. Weschler.

Graduate Advisers.—Mr. Owens, Mr. Rothchild.

The American History and Institutions Requirement may be satisfied by any two of the following courses: 1A, 1B, 100, 102, 103, 104, 105, 106, 113, 128A, 163, 164, 166. See also page 34.

The Major Program

Lower Division Courses.—Required: courses 1A, 1B, 2, 3, and two of the following: History 4A, 4B, 4C.

Upper Division Courses.—Required: 40 units as follows:

(a) 28 units in Political Science with a minimum of two courses in each of three fields, which must be selected from two of the following groups:

Group A

Political Theory (courses 110-119).

Group B

American Government (courses 102-109).

Political Parties (courses 160-169).

¹ Absent on leave, 1968-69.

Public Law (courses 150-159).

Public Administration (courses 180-189).

Group C

Comparative Government (courses 140-149, 170-179).

International Relations (courses 120-139).

(b) 12 additional units in Political Science or related subjects.

Political Science students *must* maintain at least a grade C average in the major.

Graduate Study.—The Department offers programs of graduate study leading to the M.A. and Ph.D. degrees. Information concerning admission to these programs and requirements for completion is available in the department office.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—Thirty units of political science to be selected in consultation with the subject representative.

Subject Representative: Mr. Sokolow

Lower Division Courses

1A. American Government. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. National, state, and local government in the United States. The Staff

1B. American Government. (4) I, II, III.

Lecture—2 hours; discussion—2 hours. National, state, and local government in the United States. The Staff

2. Introduction to Government: Comparative Government. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Constitutional principles, governmental institutions, and political problems of selected European governments. The Staff

3. International Relations. (4) I, III.

Lecture—3 hours; discussion—1 hour. Rise and development of the Western State systems; problems of nationalism and imperialism, particularly in connection with the peace settlement following World War II. The Staff

Upper Division Courses

100. American National Government. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: not open to students having credit for course 1A or 1B. Presidential leadership; executive-legislative relationships; the development of effective and accountable administration; defense and foreign policy; and government and science. The Staff

102. Comparative State Government and Politics. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: not open to students who have credit in course 104. The comparative study of the government and politics of American states, including their constitutional frameworks, their participation in the federal system, the dynamics of governmental institutions, and the behavior of parties and interest groups. Mr. Sokolow

103A. Local Government and Politics. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A or consent of instructor. The politics and government of local communities in the United States, including cities, counties, and special districts. The expression and resolution of political conflict in communities, local government structure and functions, municipal reform, and community power structures. Mr. Sokolow, Mr. Weschler

103B. Local Government and Politics: Urban Problems. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103A or consent of instructor. The politics and government of urban communities in the United States. Special attention to the problems of metropolitan and regional areas. Mr. Sokolow, Mr. Weschler

104. California State and Local Government. (3) III.

Lecture and discussion—3 hours. California's constitution, party system, legislature, executive agencies, administration, courts, major public programs and problems; state-local relations; county, city, school and special district governments. Offered in odd-numbered years. Mr. Weschler

105. The Legislative Process. (4) II.

Lecture—3 hours; discussion—1 hour. An 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. Mr. Owens

106. The Presidency. (4) III.

Lecture—3 hours; discussion—1 hour. The office, powers, and role of the President of the United States. Mr. Hardin

110. Contemporary Political Science. (4) I.

Lecture and discussion—4 hours. History, nature, and methodology of the discipline; the problems, schools of thought, and trends within the field at present. To be offered in even-numbered years.

111. Systematic Political Science. (4) II.

Lecture and 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.

Lecture—3 hours; discussion—1 hour. The major contemporary attempts to reformulate traditional democratic theory; attempts to replace traditional theory by conceptual models derived from modern social science findings.

Mr. Peterman

113. The American Political Experience. (4) I.

Lecture and discussion—4 hours. Origins and nature of American political thought and practice from medieval background to the present. Study of America in comparative context to develop a comprehensive understanding of the unique character and limits of our heritage.

114. Politics and Political Man in Political Theory.

(4) III.

Lecture—3 hours; discussion—1 hour. The defense and criticism of political life: an investigation of those political writers who have defended political life and political man against its critics.

Mr. Zetterbaum

117A. Marxism. (4) I.

Lecture and discussion—4 hours. Historical background and context of Marxism. Exploration of Marx's writings toward understanding his significance in the nineteenth century and his relevance today. Offered in odd-numbered years.

117B. Contemporary Marxism. (4) II.

Lecture and discussion—4 hours. Marxism after Marx to the present, with reference to Engels, Kautsky, Bernstein, Lenin, and contemporary figures and movements. Special attention to Marxism in America. Communism and democratic socialism as legacies of Marx related to contemporary problems. To be offered in even-numbered years.

118A. History of Political Theory. (4) I.

Lecture—3 hours. Critical analyses of the works of major political philosophers. Classical and medieval political philosophy—Plato, Aristotle, Cicero, St. Thomas. Mr. Peterman

118B. History of Political Theory. (4) II.

Lecture—3 hours. Critical analyses of the works of major political philosophers. Modern political philosophy—Machiavelli, Hobbes, Locke, Rousseau, Burke, Nietzsche.

119. Modern Political Thought. (4) III.

Lecture and discussion—4 hours. The search for community from Marx to the present. Communism, fascism, capitalism, socialism, irrationalism, immoralism, and existentialism as re-

sponses to the decline of liberalism and the nature of modern problems. Offered in odd-numbered years.

120. Science and International Relations. (4) II.

Lecture—4 hours. The impact of science and technology upon the international legal and political order.

122A. International Law. (4) II.

Lecture—4 hours. Sources and theories of international law. The relation of international law to municipal law. Territory, sovereign immunity, responsibility, recognition, and succession in the law of nations.

122B. International Law. (4) III.

Lecture—4 hours. Neutrality, belligerency, and war in the international community. Pacific settlement of disputes.

123. Theories of International Politics. (4) II.

Lecture—4 hours. Major contemporary approaches to the study of international politics, including balance of power, national interest, Marxist-Leninist theory, systems theory, and decision-making analysis.

124. International Organization. (4) I.

Lecture—4 hours. The preservation of world peace through collective security arrangements. Analysis of the conditions under which international organizations can or cannot preserve peace, through examination of the record of the United Nations, League of Nations, and more restricted security organizations.

128A. Recent American Foreign Policy. (4) I.

Lecture—4 hours. Abandonment of isolation and assumption of leadership during the First World War. Return to isolationist policies in the twenties. The neutrality acts of the thirties. The Second World War and reversal of the policy of isolation.

128B. The Conduct of American Foreign Relations.

(4) III.

Lecture—3 hours; discussion—1 hour. Diplomacy and the conduct and control of foreign relations. The Department of State and the Foreign Service. Case studies in recent diplomacy to illustrate policy formation and execution. Some comparative materials will be introduced but emphasis will be placed upon the United States.

131. Soviet Foreign Policy. (4) II.

Lecture—3 hours; discussion—1 hour. The 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. To be offered in odd-numbered years.

Mr. Zinner

132. The Role of the United States in the Far East.

(4) I.

Lecture—4 hours. Recommended: course 3. A survey of the role the United States has played in the Far East through an examination of such topics as America's participation in Asiatic westernization, United States Far Eastern policy, Oriental attitudes toward the United States. An evaluation of present problems. To be offered in odd-numbered years. Mrs. Kallgren

***133. International Relations in the Far East. (4) III.**

Lecture—4 hours. Recommended: course 3. Contemporary developments in the Far East, and selected issues of world significance.

Mrs. Kallgren

134. International Relations in Africa. (4) III.

Lecture—3 hours; discussion—1 hour. Inter-African state relations, pan-Africanism, regional integration, policies toward South Africa, and relations between African and major non-African powers.

Mr. Rothchild

137. Nationalism and Imperialism. (4) III.

Lecture—4 hours. Recommended: course 3. The theory of nation building illustrated by Western and non-Western experience. To be offered in even-numbered years. Mrs. Kallgren

139. International Relations in Western Europe.

(4) II.

Lecture—4 hours. Study of the emerging unity in Western Europe and its implications for the North Atlantic area.

141. Soviet and East European Governments. (4) I.

Lecture—3 hours; discussion—1 hour. The governmental systems of the Soviet Union and the East European satellites; background seizure of power, techniques of totalitarian control.

Mr. Zinner

142. Revolution and Political Change. (4) II.

Lecture—4 hours. The attributes, problems, means, and impact of political change through evolution and revolution in the twentieth century. Emphasis upon movements and systems representative of communism, fascism, and nationalism.

Mr. Groth

143. Government and Politics of Overseas Economic Development. (4) II.

Lecture—3 hours; discussion—1 hour. Analysis of programs aimed at economic development with special reference to agriculture in selected Latin American and South Asian countries. To be offered in odd-numbered years.

Mr. Gable

* Not to be given, 1968-69.

144. Government in Great Britain and the British Commonwealth. (4) II.

Lecture—3 hours; discussion—1 hour. The democratic process in Britain; party politics; the cabinet system; the colonies; the evolution of the British Commonwealth.

Mr. Groth

145. Government and Politics in Emergent Nations. (4) III.

Lecture—3 hours; discussion—1 hour. 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. To be offered in even-numbered years.

Mr. Zinner

146A. African Governments and Politics. (4) I.

Lecture—4 hours. An analysis of political systems in Africa south of the Sahara.

Mr. Rothchild

146B. African Governments and Politics. (4) II.

Lecture—4 hours. A continuation of course 146A.

Mr. Rothchild

147A. Western European Governments: France and Italy. (4) I.

Lecture—4 hours. The evolution and contemporary nature of French and Italian political institutions.

Mr. Groth

147B. Western European Government: Germany. (4) II.

Lecture—4 hours. Comparative study of the politics and institutions of constitutional and totalitarian government in Germany since 1930. Current problems of a divided Germany.

Mr. Hanf

148A. Government and Politics in East Asia. (4) I.

Lecture—4 hours. The structure and evolution of political institutions in China, Japan, and Korea. Emphasis upon such topics as nationalism, political modernization, and ideology up to World War II.

Mrs. Kallgren

148B. Government and Politics in East Asia. (4) II.

Lecture—4 hours. The structure and evolution of political institutions in China, Japan, and Korea since World War II, with emphasis upon political modernization, ideology, and nationalism.

Mrs. Kallgren

149. International Communism. (4) II.

Lecture—3 hours; discussion—1 hour. The 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. To be offered in even-numbered years.

Mr. Zinner

150. Jurisprudence. (4) II.

Lecture—4 hours. An analysis of the nature and functions of law. Particular attention will be directed to law as an instrument of social control and the relationship between law and morality. To be offered in even-numbered years.

Mr. Bernstein

151. Civil Rights and the Constitution. (4) I.

Lecture—4 hours. Prerequisite: course 1A. The constitutional rights and political possibilities of minority groups. Citizenship in the American federal system.

Mr. Bernstein

152. The Administration of Justice. (4) I.

Lecture—4 hours. Prerequisite: course 1A, 1B, or 100, or consent of instructor. The evolution of judicial machinery; present arrangements and plans for reorganization; justice and social classes; the revolution in the constitutional law for the criminally accused; problems in welfare and family law. To be offered in even-numbered years.

Mr. Bernstein

156. Administrative Law. (4) I.

Lecture—3 hours; discussion—1 hour. The political-legal factors in the decision-making processes of administrative legislation, adjudication and discretion; legal controls as an aspect of administrative responsibility; relationship of substance and procedure in regulatory action.

157A. American Constitutional Law. (4) II.

Lecture—1 hour; discussion—3 hours. Prerequisite: courses 1A and 1B; or consent of instructor. Judicial review, jurisdiction of the federal courts, interstate and foreign commerce, and taxation.

Mr. Jacobs

157B. American Constitutional Law. (4) III.

Lecture—1 hour; discussion—3 hours. Prerequisite: course 157A. The Bill of Rights of the Federal Constitution.

Mr. Jacobs

158. American Legal Thought and Institutions. (4) III.

Lecture—4 hours. Prerequisite: course 1A, 1B, or 100, or consent of instructor. Topics in the development of American legal thought and institutions: reception of the common law; church-state controversies; the role of judge and jury; federalism and individual rights; natural law and economic regulation; law and the frontier. To be offered in odd-numbered years.

Mr. Bernstein

159. Judicial Behavior. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1A. Analysis of the behavior of judges and courts in the political process. Techniques of judicial decision-making. Relationships among courts and other decision-making bodies.

Mr. Bernstein

161. Political Behavior. (4) II.

Lecture—3 hours; conference—1 hour. Prerequisite: course 1A. The individual and group aspects of partisan behavior; political socialization, partisanship and political participation, voting behavior and group influence processes.

Mr. Owens

163. Political Parties. (4) I.

Lecture—3 hours; discussion—1 hour. An analysis of the structure and operations of the party system in the United States; party functions and organization, nomination processes, campaigns and elections, party trends and reforms.

Mr. Owens

164. Group Politics. (4) II.

Lecture—3 hours; discussion—1 hour. An analysis of class, sectional, ethnic, religious, economic, and other interests in relation to constitutional government. The problem of balancing liberty and order and of reconciling claims of diversity with those of uniformity.

Mr. Hardin

165. Public Opinion and Propaganda. (5) I.

Lecture—4 hours. Prerequisite: course 1A. The nature and function of public opinion; the formation of opinion with emphasis on the role of propaganda; the distribution of political attitudes among the public; the impact of public opinion.

Mr. Costantini

166. Public Policy and the Government Process. (4) I.

Lecture—3 hours; discussion—1 hour. An examination of the processes of formulating public policy. Methods of policy making by executive, legislative, judicial, and party agencies illustrated with case studies from agriculture, labor, civil rights, and other areas.

Mr. Weschler

167. Government and the Economy. (4) I.

Lecture—3 hours; discussion—1 hour. The legal and political environment of economic controls; types and techniques of regulating and assisting various sectors of the economy; policy alternatives and administrative processes; the search for the public interest.

Mr. Gable

168. Policy and Politics in Agriculture and Water. (4) III.

Lecture—3 hours; discussion—1 hour. Agricultural and water policies and their political implications, with chief emphasis upon the United States and with special attention to water policies in California.

Mr. Hardin

172. Latin American Politics. (4) I.

Lecture—4 hours. Prerequisite: course 2 and a basic economics course, or consent of instructor. Survey of political processes in Latin America, with special attention to basic political problems, and major socio-political groups in three nations: Argentina, Brazil and Mexico (a fourth country may be added).

Mr. Tuohy

174. Political Culture and Politics. (4) III.

Lecture—4 hours. Prerequisite: courses 1A, 1B, or 2, or consent of instructor. Examination of the relationships between politically relevant attitudes, beliefs and values, on the one hand, and political behavior and governmental performance. To be offered in odd-numbered years.

Mr. Tuohy

178. Community Politics: Power and Influence. (4) III.

Lecture—4 hours. Prerequisite: courses 1A, 1B or 2, or consent of instructor. Consideration of political power in local communities; emphasis on empirical bases for making judgments on the nature and location of such power, as well as ideological assumptions reflected in the literature. To be offered in even-numbered years.

Mr. Tuohy

181. Elements of Public Administration. (4) I.

Lecture—3 hours; discussion—1 hour. The role of public administration in modern government; the nature of administrative agencies; human behavior in the administrative process, executive leadership and decision making; bureaucracy and bureaucratic accountability in a democratic society.

Mr. Hanf

183. Administrative Behavior. (4) II.

Lecture—4 hours. The implications for American public administration of evolving concepts about behavior in organizations.

185. Comparative Administration. (4) III.

Lecture—3 hours; discussion—1 hour. Theories and models of comparison; the ecology of administrative systems; functional processes of administration in developed and developing nations; role of bureaucracy in development and nation-building.

Mr. Gable

186. Urban Administration. (4) III.

Lecture—3 hours; discussion—1 hour. Role of the professional administrator in the urban political and social environment; application of modern management concepts to urban governmental organizations; and examination of persistent and emerging problems and issues.

187. Administrative Theory. (4) III.

Lecture—3 hours; discussion—1 hour. An 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; and examination of the role of government bureaucracies in the total society.

Mr. Hanf

190. Selected Problems in State and Local Government. (4) II.

Seminar—4 hours. An undergraduate seminar

for students enrolled in the Sacramento Seminar Program. Guests and staff members will conduct seminar sessions on contemporary problems in California government and politics. Students will have the opportunity to share in the experiences of actual practitioners.

The Staff

194H. Special Study for Honors Students. (2-4) I, II, III.

Prerequisite: honors status.

The Staff

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

The Staff

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

The Staff

Graduate Courses**202. American State and Local Government. (4) I.**

Lecture—2 hours; discussion—2 hours. Prerequisite: courses 102, 103A, 103B or consent of instructor. The analysis of American state and local government and politics. Special emphasis on community power structure, federalism, state legislatures, and state administration.

Mr. Sokolow, Mr. Weschler

213. Modern Political Thought. (4) III.

Seminar—3 hours.

.215. Basic Problems of Political Theory. (4) II.

Lecture—3 hours. Prerequisite: 4 units of political theory or consent of instructor. An examination of the fundamental assumptions underlying various approaches to an understanding of politics, emphasizing the scientific or value-free school, the historicist school, and the contributions of analytic philosophy.

Mr. Peterman

218. Political Theory. (4) I.

Seminar—3 hours.

Mr. Zetterbaum

223. International Relations. (4) II.

Seminar—3 hours.

The Staff

224. International Organization. (4) I.

Seminar—3 hours.

The Staff

230. American Foreign Policy. (4) III.

Seminar—3 hours.

The Staff

240. Democracy and Dictatorship. (4) III.

Lecture—3 hours. Prerequisite: one upper division course in comparative government, or consent of the instructor. Analytical study of differences and similarities in the political process under democratic and dictatorial government. To be offered in odd-numbered years.

Mr. Zinner

#241A-241B. Soviet and East European**Governments. (4-4) I-II.**

Seminar—3 hours.

Mr. Zinner

† Not to be given, winter quarter 1969.

246. Government in Africa. (4) III.

Seminar—3 hours. Mr. Rothchild

247A. Western European Governments. (4) I.

Seminar—3 hours. Contemporary problems, with emphasis on France and Italy. Mr. Groth

247B. Western European Governments. (4) III.

Seminar—3 hours. Prerequisite: consent of instructor. Contemporary problems, with emphasis on Germany.

248. The Far East. (4) II.

Seminar—3 hours. Selected contemporary problems of government and international relations in the Far East. Mrs. Kallgren

261. Political Behavior. (4) III.

Seminar—3 hours. Mr. Owens

270. National and Regional Integration. (4) I.

Lecture—3 hours. Prerequisite: one upper division course in comparative government or international relations, or consent of instructor. An examination of the means and motives of regional integration as well as the problems involved in operating and maintaining federations. Classical federal experience and experiments in developing countries will be considered. Mr. Rothchild

272. Latin American Political Problems. (4) II.

Seminar—3 hours. Prerequisite: course 172 or consent of instructor. Selected contemporary problems of government and international relations in Latin America. Mr. Tuohy

282. Concepts and Problems in Public Administration. (4) III.

Discussion—3 hours. The nature of administrative processes in modern society; analysis of complex organizations; contemporary management practices and processes; and means of controlling bureaucracy. Offered in even-numbered years. Mr. Gable

285. Modernization and Administration in Transitional Societies. (4) II.

Seminar—3 hours. Nature of traditional and transitional societies; theories and processes of modernization; role of bureaucracy in development; problems of national integration and maintaining stability; role and administration of foreign assistance to development. Offered in odd-numbered years. Mr. Gable

286. Public Administration. (4) III.

Seminar—3 hours. An examination of American administrative values. Offered in odd-numbered years.

291. Seminar in American Constitutional Law. (4) III.

Seminar—3 hours. Prerequisite: course 157B, or consent of instructor. Mr. Jacobs

295. Political Parties. (4) I.

Seminar—3 hours. Mr. Hardin

296. Selected Problems in State and Local Government. (4) II.

Seminar—3 hours. Prerequisite: course 202, or consent of instructor. Selected topics in state and local government and politics.

Mr. Sokolow, Mr. Weschler

298. Group Study. (1-4) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

299D. Directed Reading. (1-6) I, II, III.

The Staff

Professional Course

400. Field Work in Political Science. (1-4) I, II, III.

Directed study and internship in a government agency, office, or political party. May be repeated twice for credit. The Staff

POMOLOGY—See Plant Sciences

PORtUGUESE—See Spanish

PSYCHOLOGY

Robert Sommer, Ph.D., *Chairman of the Department*

Department Office, 149 Young Hall

Professors:

William F. Dukes, Ph.D.

Joseph Lyons, Ph.D.

Robert Sommer, Ph.D.

Associate Professors:

Jarvis R. Bastian, Ph.D.

Stanley Coopersmith, Ph.D.

Thomas Natsoulas, Ph.D.

Assistant Professors:

- Gordon H. Berman, Ph.D.
 John J. Bintz, Ph.D.
 Alan C. Elms, Ph.D.
 Albert A. Harrison, Ph.D.
 Neal A. Kroll, Ph.D.
 Dale F. Lott, Ph.D.
 Gary D. Mitchell, Ph.D. (*Psychology and Primate Biology*)
 Robert M. Murphrey, Ph.D.
 Theodore E. Parks, Ph.D.
 Charles T. Tart, Ph.D.
 Edward D. Turner, Ph.D.
 Morris H. Woskow, Ph.D. (*Psychology and Food Science and Technology*)

◊ ◊ ◊

Lecturers:

- Arthur Burton, Ph.D.
 John R. Emery, Ph.D.
 Benjamin L. Hart, Ph.D., D.V.M. (*Psychology and Anatomy*)
 Sumner B. Morris, Ed.D.
 Jack C. Pfugrath, Ph.D.

Departmental Major Advisers.—Mr. Bastian, Mr. Berman, Mr. Bintz, Mr. Coopersmith, Mr. Elms, Mr. Harrison, Mr. Kroll, Mr. Lott, Mr. Lyons, Mr. Mitchell, Mr. Murphrey, Mr. Nat-soulas, Mr. Parks, Mr. Sommer, Mr. Tart, Mr. Turner.

The Major Program

Lower Division Courses.—Required: Psychology 1A, 1B, 1C, 3; also the student must take either sequence (a) or (b) below.

- (a) Physiology 2
- (b) Mathematics 16B and Biology 1, or Mathematics 16B and any two of the following courses: Anthropology 1, Physiology 10, Genetics 10, or for transfer students, their equivalents.

Upper Division Courses.—Required: 36 units of advanced work in psychology (courses numbered above 99) including: course 196 (to be taken during the senior year); three courses from one of the following groups and two courses from the other:

- (Group A) 108, 130, 131, 134, 150.
- (Group B) 112, 145, 147A, 168.

Before graduation the student must complete 8 units of philosophy and 8 units of sociology and/or cultural anthropology. These may be taken at any time during the four years and may be either lower or upper division courses.

Honors and Honors Program (see page 113).—The honors program comprises course 194H, which includes an honors thesis, to be taken normally during the senior year.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—Thirty units in psychology.
Subject Representative: Mr. Turner.

Lower Division Courses**1A. Introduction to Psychology: General Processes.**
 (4) I, II, III.

Lecture—4 hours. Sensation, perception, learning, memory, motivation, and emotion.
 The Staff

1B. Introduction to Psychology: Biological Bases of Behavior. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 1A. An analysis of behavior in terms of its evolutionary, genetic, and physiological determinants.
 The Staff

1C. Introduction to Psychology: Personality and Social Psychology. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 1A. The normal and abnormal personality. The influence of social factors on the individual.
 The Staff

3. Quantitative Description of Behavior.

- (4) I, II, III.

Lecture—4 hours. Prerequisite: course 1A; two years of high school algebra or equivalent. Not open for credit to students who have received credit for a course in statistics. Principles and problems of measurements; inference and prediction from psychological data. Primarily for psychology majors.

Mr. Kroll, Mr. Turner

33. Personal and Social Adjustment. (4) I, II, III.

Lecture—4 hours. Prerequisite: course 1A. The dynamics of normal personality development. Family relationships, social adjustment, and self-evaluation are emphasized. Primarily for students who will not major in psychology.

Messrs. Emery, Pfugrath, Morris

Upper Division Courses**106. Experimental Psychology.** (4) I, II, III.

Lecture—2 hours; laboratory—4 hours. Prerequisite: courses 1A, 3. Laboratory investigation of selected problems, including the design, execution, and formal reporting of experiments.
 Mr. Tart

107. Advanced Statistical Methods in Psychology.

- (4) III.

Lecture—4 hours. Prerequisite: course 3. Application of hypothesis-testing techniques to specific problems of psychological research and related behavioral research areas. Mr. Turner

108. Physiological Psychology. (5) III.

Lecture—3 hours; laboratory—4 hours. Prerequisite: course 1B; or course 1A and upper division standing in a biological science. An

analysis of some of the contributions of neuroanatomy, neurophysiology, and neurochemistry to a mechanistic understanding of human and animal behavior. A reductionistic approach within a behavioristic framework.

112. Developmental Psychology. (4) I, II, III.

Lecture—4 hours. Prerequisite: course 1A; not open for credit to students who have received credit for Human Development 131. An ontogenetic account of human behavior through adolescence with emphasis on motor skills, mental abilities, motivation, and social interaction.
Mr. Coopersmith, Mr. Mitchell

120. History of Psychology. (4) II.

Lecture—4 hours. Prerequisite: course 1A and upper division standing. The historical development of psychological theories and research.
Mr. Woskow

***129. Sensory Processes. (4) III.**

Lecture—3 hours; laboratory—2 hours. Prerequisite: course 1B; upper division standing in psychology; or consent of instructor. The sensory capabilities of man and animals. Behavioral evidence for sensory capacity and relationships to the structure and function of the sense organs.
Mr. Woskow

130. Learning. (4) I, III.

Lecture—4 hours. Consideration of major theories of learning and memory with critical examination of relevant experimental data.
Mr. Kroll, Mr. Parks

131. Perception. (3) I, II, III.

Lecture—3 hours. Prerequisite: course 1A. The cognitive organizations related to measurable physical energy changes mediated through sensory channels. The perception of objects, space, motion, events.
Mr. Natsoulas, Mr. Turner

131L. Laboratory in Perception. (2) II, III.

Laboratory—4 hours. Prerequisite: course 106, 131 completed or in progress. Experimental work in perceiving.
Mr. Natsoulas, Mr. Turner

132. Language and Cognition. (4) I.

Lecture—4 hours. Prerequisite: course 1A and 6 units of upper division work in psychology. Psychological examination of linguistic actions, their development and role in human conduct; analysis of their contribution to perception and thought.
Mr. Bastian

134. Motivation. (4) I, II.

Lecture—4 hours. Prerequisite: course 1A. Factors activating and directing behavior; contemporary theories of motives; pertinent data from laboratory, clinic, and field observation.
Mr. Bintz, Mr. Lott

* Not to be given, 1968-69.

135. Psychology of Consciousness. (3) I.

Lecture—3 hours. Prerequisite: course 1A. Consideration of major theories of consciousness, with critical examination of relevant experimental, clinical, and field data.
Mr. Natsoulas

145. Social Psychology. (4) I, II, III.

Lecture—4 hours. Prerequisite: course 1A. 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.
Messrs. Harrison, Elms, Sommer

147A. Personality Theory and Assessment. (4) I, II, III.

Lecture—4 hours. Prerequisite: course 1A and 6 units upper division work in psychology. A systematic consideration of contemporary theories of personality.
Mr. Elms, Mr. Burton

147B. Personality Theory and Assessment. (4) II.

Lecture—2 hours; laboratory—4 hours. Prerequisite: course 147A. An exploration and evaluation of the principal methods in personality research.
Mr. Elms, Mr. Harrison

150. Comparative Psychology. (4) I, II, III.

Lecture—4 hours. Prerequisite: course 1B or appropriate biological training. Perspectives in animal behavior: zoological, physiological, psychological. Functional behavior categories: orientation and locomotion, feeding, reproduction, communication, learning. Behavioral theory as derived from psychological and ethological contexts.
Mr. Berman, Mr. Lott

150L. Comparative Psychology Laboratory. (2) I, II, III.

Laboratory—4 hours. Prerequisite: concurrent enrollment in course 150. Observation and analysis of behavior at various phyletic levels, with correlated outside readings.
Mr. Berman, Mr. Lott

165. Introduction to Clinical Psychology. (4) II, III.

Lecture—4 hours. Prerequisite: course 1C; 145 or 168; and 112, 134, or 147A. Psychological assessment procedures in clinical psychology; psychological methods for modifying disordered behavior—rationale, process, and outcome.
Mr. Burton, Mr. Lyons

168. Abnormal Psychology. (4) I, II, III.

Lecture—4 hours. Prerequisite: course 1A. A descriptive and functional account of behavioral disorders, with primary considerations given to neurotic and psychotic behavior.
Mr. Murphey, Mr. Sommer

171. Humanistic Psychology. (4) II, III.

Lecture—4 hours. Prerequisite: course 165 or equivalent. A survey, including lectures and

demonstrations, of humanistic, existential, or "third-force" movements in contemporary psychology. Theory, data, and techniques in the work of Maslow, Rogers, and others who emphasize creativity and self-actualization.

Mr. Tart, Mr. Lyons

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: 20 units in psychology and honors status. Independent investigation of an empirical problem. The Staff

196. Advanced General Psychology. (4) I, II, III.

Lecture—4 hours. Prerequisite: 18 units upper division work in psychology. Exploration of the present status of systematic psychology. An integrative treatment of the major areas, problems, and methodologies. Required of all majors in their senior year.

Messrs. Bastian, Dukes, Lyons

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor. Directed small group study on psychological topics of special interest and relevance to instructor and students. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses

201A. Psychobiology. (4) I.

Seminar—4 hours. An intensive consideration of behavior studies in physiological and comparative psychology, and other biological sciences. The Staff

201B. General Experimental Psychology. (4) II.

Seminar—4 hours. Prerequisite: graduate standing in psychology or permission of instructor. An intensive consideration of major areas and problems in general experimental psychology. The Staff

201C. Personality-Social Psychology. (4) III.

Seminar—4 hours. Prerequisite: graduate standing in psychology or permission of instructor. An intensive consideration of basic psychological processes in social situations including the study of variables characterizing the individual personality. The Staff

***206. Advanced Research Methods. (4) II.**

Seminar—4 hours. Prerequisite: graduate standing in psychology or permission of instructor. A survey of research methods in various areas of psychology, including naturalistic observation, correlation studies, systematic assessment, and experimental studies, and an examination of the basic assumptions underlying the use of these methods. Mr. Tart, Mr. Turner

208. Physiological Psychology. (4) II.

Seminar—4 hours. A conceptual analysis of the contributions of neuroanatomy, neurophysiology and neurochemistry to an understanding of animal and human behavior.

***212. Developmental Psychology. (4) II.**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The original behavioral repertoire of the child and its subsequent development.

Mr. Coopersmith

***230. Learning. (4) I.**

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. Mr. Parks, Mr. Kroll

231. Perception. (4) II.

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. An analysis of the role of perception in experience and its effects on behavior.

Mr. Natsoulas

***234. Motivation. (4) II.**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The origin and function of basic motivational systems as they influence behavior.

Mr. Bermant, Mr. Lott

245. Social Psychology. (5) II.

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in social psychology.

Mr. Harrison

***247. Personality. (4) III.**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and research in human personality.

Mr. Coopersmith, Mr. Lyons

***250. Comparative Psychology. (4) III.**

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. The study of animal behavior in an evolutionary and comparative framework.

Mr. Bermant, Mr. Lott

251. Genetic Correlates of Behavior. (4) I.

Seminar—4 hours. Prerequisite: graduate standing in psychology or consent of instructor. Theory and experiment in the genetic determination of animal and human behavior.

Mr. Murphey

288. Research Preceptorship. (4) I, II, III.

Laboratory and discussion—6-9 hours. Prerequisite: consent of instructor. The Staff

* Not to be given, 1968-69.

290. Seminar. (4) I, II, III.

Seminar—4 hours. Prerequisite: consent of instructor. A 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.

The Staff

***291. Seminar in Psychobiology. (4) I, II, III.**

Seminar—4 hours. Recommended: course 201A.

The Staff

***292. Experimental Study of Personality.**

(4) I, III.

Seminar—4 hours.

Mr. Coopersmith, Mr. Lyons

293. Environment and Behavior. (4) II.

Seminar—4 hours. The social psychology of the environment. Research into the use of space and its design implications.

Mr. Sommer

294. Psycholinguistics. (4) I.

Seminar—4 hours.

Mr. Bastian

***295. Comparative and Physiological Psychology of Reproductive Behavior. (4) III.**

Seminar—4 hours. Biological bases of reproductive behavior; neural, hormonal, and environmental controls.

Mr. Berman

298. Group Study. (1-4) I, II, III.

The Staff

299. Research. (2-9) I, II, III.

The Staff

RANGE MANAGEMENT—See Resource Sciences**RESOURCE SCIENCES**Verne H. Scott, Ph.D., *Chairman of the Committee*

Committee Office, 121 Veihmeyer Hall

Committee in charge:Harry W. Colvin, Jr., Ph.D. (*Animal Physiology*)Kinsell L. Coulson, Ph.D. (*Agricultural Engineering*)Harry C. Kohl, Jr., Ph.D. (*Environmental Horticulture*)R. Merton Love, Ph.D. (*Agronomy*)Victor V. Rendig, Ph.D. (*Soils and Plant Nutrition*)Verne H. Scott, Ph.D. (*Water Science and Engineering and Civil Engineering*)J. Herbert Snyder, Ph.D. (*Agricultural Economics*)Harry O. Walker, Ed.D. (*Agricultural Practices*)**Subcommittees in charge of majors:****ATMOSPHERIC SCIENCE**Kinsell L. Coulson, Ph.D., Chairman
(*Agricultural Engineering*)Donald L. Morgan, M.S. (*Water Science and Engineering*)Leonard O. Myrup, Ph.D. (*Agricultural Engineering*)Edward D. Schroeder, Ph.D. (*Civil Engineering*)Herbert B. Schultz, Ph.D.
(*Agricultural Engineering*)Perry R. Stout, Ph.D. (*Soils and Plant Nutrition*)**PARK AND RECREATION ADMINISTRATION**Harold O. Carter, Ph.D. (*Agricultural Economics*)Richard W. Harris, Ph.D. (*Environmental Horticulture*)Harry C. Kohl, Jr., Ph.D., Chairman
(*Environmental Horticulture*)William L. Lakie, Ed.D. (*Physical Education*)Armand R. Maggenti, Ph.D. (*Nematology*)A. H. McClelland, Ph.D. (*Entomology*)George Nyland, Ph.D. (*Plant Pathology*)**RANGE MANAGEMENT**Floyd M. Ashton, Ph.D. (*Agricultural Botany*)Harold H. Biswell, Ph.D. (*Forestry, Berkeley Campus*)Robert H. Burgy, M.S. (*Water Science and Engineering and Civil Engineering*)Warren E. Johnston, Ph.D. (*Agricultural Economics*)R. Merton Love, Ph.D., Chairman
(*Agronomy*)William C. Weir, Ph.D. (*Animal Science*)

* Not to be given, 1968-69.

RENEWABLE NATURAL RESOURCES

G. Eric Bradford, Ph.D. (*Animal Science*)
C. C. Delwiche, Ph.D. (*Soils and Plant Nutrition*)
Warren E. Johnston, Ph.D. (*Agricultural Economics*)

Verne H. Scott, Ph.D., Chairman (*Water Science and Engineering and Civil Engineering*)
Harry O. Walker, Ed.D. (*Agricultural Practices*)
William A. Williams, Ph.D. (*Agronomy*)

SOIL AND WATER SCIENCE

James W. Biggar, Ph.D. (*Water Science and Engineering*)
Richard G. Burau, Ph.D. (*Soils and Plant Nutrition*)
Donald N. Munns, Ph.D. (*Soils and Plant Nutrition*)

Donald R. Nielsen, Ph.D. (*Water Science and Engineering*)
Victor V. Rendig, Ph.D., Chairman (*Soils and Plant Nutrition*)
J. Herbert Snyder, Ph.D. (*Agricultural Economics*)

WILDLIFE AND FISHERIES BIOLOGY

*Ursula H. Abbott, Ph.D. (*Poultry Husbandry*)
Harry W. Colvin, Jr., Ph.D., Chairman. (*Animal Physiology*)
Charles R. Goldman, Ph.D. (*Zoology*)

Everett W. Jameson, Jr., Ph.D. (*Zoology*)
Frank X. Ogasawara, Ph.D. (*Poultry Husbandry and Animal Physiology*)
Richard D. Teague, B.S. (*Zoology Extension*)

Participating Departments:

SOILS AND PLANT NUTRITION

C. C. Delwiche, Ph.D., Chairman of the Department
Department Office, 139B Hoagland Hall

Professors:

Daniel G. Aldrich, Ph.D. (*Irvine Campus*)
C. C. Delwiche, Ph.D.
Frank F. Harradine, Ph.D.
Perry R. Stout, Ph.D.

Associate Professor:

Lynn D. Whittig, Ph.D.

Lecturers:

Eugene L. Begg, B.S.
Arthur L. Brown, Ph.D.
Gordon L. Huntington, M.S.
Donald N. Munns, Ph.D.
Donald W. Rains, Ph.D.
H. Michael Reisenauer, Ph.D.

WATER SCIENCE AND ENGINEERING

Verne H. Scott, Ph.D., Chairman of the Department
Department Office, 113 Veihmeyer Hall

Professors:

Jaime Amorocho, Ph.D. (*Water Science and Engineering and Civil Engineering*)
Robert H. Burg, M.S. (*Water Science and Engineering and Civil Engineering*)
Lloyd D. Doneen, Ph.D.
Robert M. Hagan, Ph.D.
Delbert W. Henderson, Ph.D.

James N. Luthin, Ph.D. (*Water Science and Engineering and Civil Engineering*)
Verne H. Scott, Ph.D. (*Water Science and Engineering and Civil Engineering*)
Frank J. Veihmeyer, Ph.D. (*Emeritus, Water Science and Engineering and Civil Engineering*)

² Absent on leave, fall quarter 1968.

Associate Professors:

James W. Biggar, Ph.D.
Donald R. Nielsen, Ph.D.

Assistant Professors:

Theodore C. Hsiao, Ph.D.
Allen W. Knight, Ph.D.
Theodor S. Strelkoff, Ph.D. (*Water Science
and Engineering and Civil Engineering*)

Lecturers:

William E. Hart, M.S.
William O. Pruitt, Jr., M.S.

*Departmental Major Advisers—See Schedule
and Directory Listing.*

Bachelor of Science Major Program and Graduate Study. See pages 81 and 133.

Atmospheric Science**Lower Division Courses****20. Introduction to Meteorology. (3) III.**

Lecture—3 hours. Prerequisite: Mathematics 21B or equivalent. Basic concepts of modern meteorology: weather and weather elements, atmospheric circulations, clouds, precipitation, radiation, instruments and observations, meteorological satellites.

Upper Division Courses**120. Atmospheric Thermodynamics and Statics. (3) I.**

Lecture—3 hours. Prerequisite: Mathematics 22C, Physics 4C. The 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.

Mr. Myrup

121. Dynamics of the Atmosphere. (3) II.

Lecture—3 hours. Prerequisite: course 120. The atmosphere in motion: the equations of motion on a rotating earth, pressure and temperature fields and their relations to atmospheric circulations, modern numerical methods in meteorology.

Mr. Myrup

122. Atmospheric Radiation. (3) II.

Lecture—3 hours. Prerequisite: Mathematics 22C, Physics 4C. Basic laws of radiation; properties of solar radiation; absorption, reflection and scattering in atmosphere; planetary albedo; absorption and emission by atmospheric gases and aerosols; atmospheric energy budget.

Mr. Coulson

123. Micrometeorology. (3) III.

Lecture—3 hours. Prerequisite: course 120, 121, 122. Properties of the atmosphere near the earth's surface: frictional effects, mass and energy transfers across the surface-atmosphere

interface, and the effect of these in modifying the localized environment are the principal topics discussed.

Mr. Coulson

124. Meteorological Instruments and Observations. (3) I.

Lecture—2 hours. Prerequisite: course 20 or equivalent. Modern meteorological instruments and their use in meteorological observations and measurements. Both standard and micrometeorological instruments are included.

Mr. Coulson

Park and Recreation Administration**Upper Division Courses****100. City and Regional Aesthetics. (3) I.**

Lecture—3 hours. Recommended for non-majors. Perception of the environmental components of the city and region in concept and actuality. Influence of utopian ideas, analysis of existing solutions, and consideration of alternative approaches.

Mr. Danielson

110. Introduction to City Planning. (4) II.

Lecture—4 hours. Recommended for non-majors. Studies of the physical, social and economic problems which have resulted in the evolution of city planning; major concepts and procedures used by city planners and local governments to improve the urban environment.

Mr. Cutters

134. Park and Recreation Area Planning. (4) III.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Environmental Horticulture 1. Principles, standards, and procedures in planning and design of areas for park recreation use. Offered in even-numbered years.

Mr. Danielson

140. Park Administration. (3) III.

Lecture—3 hours. Prerequisite: consent of instructor. The acquisition, development, and management of parks, street tree plantings, and other landscaped areas.

Mr. McVicar

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. 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.

Mr. Danielson

198. Directed Group Study. (1-5) I, II, III.

Prerequisite: consent of instructor.

Mr. Danielson

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: 3 units of upper division work in park administration; consent of instructor.

The Staff

Range Management

Lower Division Course

1. Introduction to Range Management. (4) II.

Lecture—3 hours; discussion—1 hour. Basic principles of range management and their relationships to the management of wildlands for livestock production, wildlife, water, recreation, and timber.
Mr. Biswell

Upper Division Courses

100. Range Plants. (4) I.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Botany 2. Systematic relationships and identification of range grasses; legumes, forbs, and shrubs; their distribution, environmental requirements, and use. One Saturday field trip.
Mr. Crampton

103. Grassland Inventory, Analysis and Planning. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 100; or consent of instructor. Sampling grasslands and other vegetational types to determine species composition, forage production and utilization, carrying capacity, and changes in the plant community. Range inventory analysis and planning range use. Offered in odd-numbered years.
Mr. Heady

105. Summer Field Course. (6) Extra-Session.

Lecture—8 hours; laboratory—24 hours. Prerequisite: consent of instructor. Four weeks devoted to field studies of range condition and methods of utilization in various parts of the state. Required of all students with a major in range management.
Mr. Love

133. Grassland Ecology. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course in plant ecology; or consent of instructor. Composition, structure, development, and habitat factors of native North American grasslands. Concepts used in vegetative measurements. Principles of grassland management for forage production. Offered in even-numbered years.
Mr. Schultz

194H. Special Study for Honors Students. (1–5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. 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. The Staff

198. Directed Group Study. (1–5) I, II, III.

Prerequisite: consent of instructor. The Staff

199. Special Study for Advanced Undergraduates. (1–5) I, II, III.

Prerequisite: senior standing and consent of instructor.
The Staff

Graduate Courses

290. Seminar. (1–2) I, II, III.

Seminar—1–2 hours.

Mr. Love

299. Research. (1–9) I, II, III.

The Staff

Renewable Natural Resources

Upper Division Courses

100. Concepts in Renewable Natural Resources. (3) I.

Lecture—3 hours. Prerequisite: junior standing in the resource sciences curriculum. An introduction to the concepts and principles of integrated resource analysis and planning.

190. Proseminar in Renewable Natural Resources. (1) I, II, III.

Seminar—1 hour. Prerequisite: senior standing in resource sciences curriculum. Selected topics in renewable natural resources. The Staff

Soil Science

Upper Division Courses

105. Summer Field Course. (8). (Extra Session)

Lecture—8 hours; field study—48 hours. Prerequisite: course 120B or consent of instructor. Field study of soils, *in situ*, with special emphasis on their characteristics, morphology, and genesis. Field exercises in classifying and mapping soils, and preparation of soil survey reports. Practice in identifying and evaluating soils for agricultural, range, forest, and other use.
Mr. Begg, Mr. Huntington

109. Soil Fertility and Fertilizers. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Soil and Water Science 2. The forms and availability of plant nutrient elements in soils; composition and use of fertilizers and soil amendments; laboratory exercises in fertility assays and their interpretation. Mr. Reisenauer

120A. Soil Genesis and Morphology. (2) II.

Lecture—2 hours. Prerequisite: Soil and Water Science 2; Geology 1 or 2. Basic principles of geomorphology; soil forming factors and processes as they influence the genesis and characteristics of soil properties. Mr. Harradine

120B. Soil Classification, Mapping, and Evaluation. (3) III.

Lecture—2 hours; laboratory or field—3 hours. Prerequisite: course 120A. Basic principles underlying various systems of soil classification and mapping; methods of evaluating and rating soils for land use.
Mr. Harradine

123. Chemistry of Arid Soils. (4) II.

Lecture—2 hours; laboratory—6 hours. Prerequisite: Chemistry 5; Soil and Water Science 102. Diagnostic procedures for assessing features of soil chemistry related to plant growth, with emphasis on soils of arid regions and problems of salinity. Theoretical basis of the procedures and its bearing on the interpretations of results.

Mr. Brown

or 110B; Soil and Water Science 102. Nature, properties, and occurrence of the more common minerals in soils and rocks. Application of mineral analysis methods in the study of the formation and properties of soils and of weathering of minerals. X-ray, thermal, and chemical analyses of mineral fractions.

Mr. Whittig

144. Advanced Instrumentation in Biology. (3) I.

Lecture—1 hour; laboratory—6 hours. Prerequisite: consent of instructor. The application of electronic and mechanical devices to solution of problems of measurement and control in biological research; emphasis given to the synthesis and application of low current or low potential measurement equipment, vacuum techniques, optical processes, and electromagnetic transduction.

Mr. Delwiche

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open only to majors who are honors students of senior standing. 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.

The Staff

198. Directed Group Study. (1-5) I, II, III.

Directed group study in soil science for advanced undergraduates.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**207. Soil Physics. (3) III.**

Lecture—3 hours. Prerequisite: Soil and Water Science 101; Mathematics 22C recommended. Physical processes occurring in soils; selected topics in the soil-plant relationship.

208. Soil-Plant Interrelationships. (3) III.

Lecture—3 hours. Prerequisite: Botany 111; Soil and Water Science 104; or consent of instructor. An advanced course on the effects of soil factors on plant development; the influence of soil conditions, processes, and reactions on metabolic reactions in plants; effects of plant root activity on the nature of the rhizosphere.

Mr. Rendig

211. Soil Microbiology. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Chemistry 8B; Soil and Water Science 102. Soil microorganisms and their biochemical activities; plant residue decomposition; soil organic matter and its properties.

214. Soil Mineralogy. (5) I.

Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: Chemistry 109B

215. Physical Chemistry of Soils. (3) I.

Lecture—3 hours. Prerequisite: Chemistry 110C; Soil and Water Science 102. Physico-chemical, colloidal, and surface aspects of the soil system. Offered in even-numbered years.

222. Salt-affected Soils. (3) II.

Lecture—3 hours. Prerequisite: Soil and Water Science 102, or consent of instructor. Scope of soil problems in salt-prone arid zone climates; origin and encroachment of salt; chemical interactions with aluminosilicates under alkaline situations. Physiological characteristics of native and crop plant species governing salt tolerance and sensitivity.

Mr. Whittig

290. Seminar. (1) I, II, III.

Seminar—1 hour. Prerequisite: graduate standing in soil science, plant physiology, or related subjects. Topics of current interest in soil science, including research recently carried out by students, will be discussed. Each student will prepare and present reports to the seminar.

Mr. Delwiche

299. Research. (1-12) I, II, III.

The Staff

Soil and Water Science**Lower Division Courses****1. Soil, Water, and Air Resources. (3) I.**

Lecture—3 hours. Prerequisite: Biology 1 or consent of instructor. Interrelationships of man and environmental factors; utilization and development of renewable natural resources; characteristics of soil, water, and air and their relation to management and planning concepts. Open to non-majors.

Mr. Henderson

2. Soil, Water, and Air Resources. (3) II.

Lecture—2 hours; laboratory—2 hours. Prerequisite: course 1; Biology 1; Physics 2A recommended. Development and properties of soils; source and properties of water; properties of the atmosphere; soil, water, and air management in relation to crop production; planning concepts related to agricultural development and production.

Mr. Munns

Upper Division Courses**101. Physics of Soil and Water Systems. (5) II.**

Lecture—3 hours; discussion and laboratory—4 hours. Prerequisite: course 2; Physics 2B; Mathematics 16B; or consent of instructor.

Factors affecting soil physical condition and irrigation; soil texture, structure, aeration, and strength. Principles of soil management; basic concepts of hydraulics, soil water storage and movement, infiltration, water potential, irrigation and drainage. Principles of irrigation practices.

tural students. Principles for relating water, soil, plant and atmospheric conditions to irrigation planning and practices. Selecting lands for irrigation, water-soil-plant relations, irrigation requirements for principal crops, irrigation scheduling for maximum efficiency.

Mr. Henderson

102. Soil and Water Chemistry. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Chemistry 5; course 2; 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.

Mr. Burau

103. Water Quality, Salt Control, and Reclamation. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 102 or consent of instructor. Water quality, water analysis, salinity, salt and plant relations, reclamation of water and soil, infiltration problems, and soil amendments.

Mr. Doneen

104. Soil-Water-Plant Relationships. (4) III.

Lecture—4 hours. Prerequisite: courses 101, 102; Botany 2. Influence of soil physical, chemical, and biological properties and of soil water supply on plant growth; availability, uptake, and use of nutrients and water by plants; principles of soil structure, irrigation, and fertilizer management for crop production. Mr. Hsiao

110B. Irrigation Principles and Practices. (3) III.

Lecture—3 hours. Prerequisite: Physics 2B. A general course for engineering and agricultural students. Farm irrigation distribution systems, water measurement, farm water supply including wells and pumping plants, land preparation for irrigation, water application, and drainage requirements.

Mr. Henderson

116. Processes of Water and Soil Pollution. (2) I.

Lecture—2 hours. Recommended: Soil and Water Science 102, and consent of instructor. Physical, chemical and biological processes, natural and man-made, that cause pollution of water and soil; nature of pollutants, persistence, and control.

Mr. Biggar

118. Hydraulics. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Mathematics 21C or 16C; Physics 2B and 2C. Principles of incompressible fluid mechanics and hydraulics. Applications to the analysis of water conveyance, control and measurement systems; laboratory practice on selected hydraulic problems.

Mr. Amoroch

140. Farm Drainage Systems. (2) III.

Lecture—2 hours. Prerequisite: Soil and Water Science 101. Drainage principles and methods including investigation of drainage problems, types of drainage systems and layout of farm drains, and drainage requirements for land reclamation and irrigated agriculture.

Mr. Luthin

141. Hydrology. (3) II.

Lecture—3 hours. Prerequisite: course 118A or Engineering 103A. Principles of hydrologic analysis including consideration of precipitation, stream flow and ground water phenomena.

Mr. Burgy

150. Water Rights and Irrigation Institutions. (3) I.

Lecture—3 hours. Water rights: kinds, requirements, adjudication, administration, loss and evaluation. Irrigation enterprises: kinds, organization, financing, public regulation, operation, and usefulness under different conditions.

160. Water Application Systems. (4) III.

Lecture—3 hours; laboratory—3 hours. Prerequisite: senior standing in Soil and Water Science or Civil Engineering, or consent of instructor. Design, constructing and operation of water-application systems (with emphasis on farm irrigation methods) and appurtenant struc-

Water Science

Lower Division Course

10. Water and Man. (3) III.

Lecture—3 hours. Water as a factor in civilization and man's environment. Water supply and utilization problems of agricultural, domestic, industrial, and other water users in developed and developing nations. A cultural and technical course providing an introduction to water science and engineering. Mr. Hagan

Upper Division Courses

106. Principles of Soil Water Movement. (3) I.

Lecture—2 hours; laboratory—3 hours. Prerequisite: Soil and Water Science 101 (may be taken concurrently or with consent of instructor). An introduction to basic mechanisms of soil water movement with emphasis on infiltration, evaporation, and redistribution within the soil profile. Laboratory measurements of the forces involved in soil water movement.

Mr. Nielsen

110A. Irrigation Principles and Practices. (3) II.

Lecture—3 hours. Prerequisite: Physics 2B. A general course for engineering and agricul-

tures. Preparation of land for irrigation. Problem solving and field and laboratory exercises.

Mr. Hart

194H. Special Study for Honors Students.

(1-5) I, II, III.

Prerequisite: open to majors in Soil and Water Science who are honors students of senior standing. Independent study of selected topics under direction of a member of the staff. Completion will involve writing of a paper.

The Staff

198. Directed Group Study. (1-5) I, II, III.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: senior standing. The Staff

Graduate Courses

200. Water-Soil-Plant Relationships in Irrigation Programming. (3) III.

Lecture—3 hours. Prerequisite: Soil and Water Science 104, or consent of instructor. Selected topics including prediction of crop responses to irrigation, evapotranspiration and water requirements, production functions, strategy for using limited water supplies, and irrigation planning and operations for optimizing water use and crop production under conditions of developed and developing nations. Mr. Hagan

201. Water in Physiology and Biochemistry of Plants. (3) II.

Lecture—3 hours. Prerequisite: Botany 111; Chemistry 5. Recommended: Biochemistry 101B; Botany 120A and a course in physical chemistry. Solute-water interactions; water and the structure of biological macromolecules; cell-water relations; physiology and biophysics of water uptake, transport and dissipation by plants; physiology and biochemistry of stomata; water stress and plant metabolism. Mr. Hsiao

202. Evapotranspiration: Summer Course. (2).

Lecture—18 hours total, laboratory—9 hours total. Prerequisite: Agricultural Engineering 106. Analysis and prediction of evapotranspiration. Influence of climate, vegetative cover, and soil on crop water use. Field and laboratory techniques of measuring evaporation radiation, sensible heat fluxes, and determination of profiles of temperature, humidity, and wind.

Mr. Pruitt

215. Advanced Topics in Water Chemistry. (3) II.

Lecture—3 hours. Prerequisite: Soil and Water Science 102. Recommended: Chemistry 110C; Soil and Water Science 103. An advanced course in water chemistry emphasizing principles governing interactions of ionic constituents in water with soils and plants. Topics include electro-kinetic properties of clays, diffu-

sion mechanisms, hydrodynamic dispersion during leaching, and irreversible thermodynamics in soil-salt systems.

Mr. Biggar

215L. Advanced Topics in Water Chemistry Laboratory. (1) II.

Laboratory—3 hours. Prerequisite: course 215 concurrently or consent of instructor. Laboratory techniques for studying the physical and chemical interactions of soil and water.

Mr. Biggar

250. Physics of Soil Water Movement. (3) I.

Lecture—3 hours. Prerequisite: Mathematics 22C or consent of instructor. Recommended: course 106. The physics of fluid flow through porous media; miscible and immiscible displacement theories; theory of capillary pressure and pore size distribution with emphasis on unsaturated flow problems; physical aspects of permeability, porosity, specific surface, and pore structure.

Mr. Nielsen

290. Seminar. (1) II.

Seminar—1 hour. Required of all graduate students in Irrigation Science. Discussion of advanced problems in irrigation.

Mr. Nielsen

298. Group Study. (1-9) I, II, III.

The Staff

299. Research. (1-9) I, II, III.

The Staff

Wildlife and Fisheries Biology

Upper Division Courses

108. Comparative Nutrition of Wildlife and Fish. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course in biochemistry; Botany 108 or Range Management 100 recommended. The principles of nutrition and their application to feeding problems related to wild animals (ruminants and non-ruminants), birds and fish in their natural habitats and in captivity.

The Staff

110A. Principles of Wildlife Management. (3) I.

Lecture—3 hours. Prerequisite: Nutrition 108 or equivalent; Botany 108 or Range Management 100; Renewable Natural Resources 100 or consent of instructor. History of game management; properties of game populations and their environment, principles of game populations control, wildlife husbandry methods, wildlife resource economics and aesthetics.

The Staff

110B. Principles of Fish Management. (3) II.

Lecture—3 hours. Prerequisite: course 110A or consent of instructor; Zoology 140 strongly recommended. History of fish management; properties of fish populations and their environment; principles of fish population control; fish husbandry methods; fish resource economics and aesthetics. Primary emphasis upon fish of inland waters.

The Staff

110C. Field Studies in Wildlife and Fish Management. (3) III.

Laboratory—9 hours. Prerequisite: 110B or consent of instructor. A traveling field study program into the various key wildlife resource areas of the state managed under County, State, Federal and private jurisdiction. The Staff

115. Wildlife and Fisheries Law. (3) II.

Lecture—2 hours. Prerequisite: Wildlife Biology 110A. The interpretation of laws, rules, treaties, agreements and regulations of State, Federal and International origin which pertain to wildlife and fisheries. The Staff

RHETORIC

James J. Murphy, Ph.D., Chairman of the Department
Department Office, 207 North Hall

Professor:

James J. Murphy, Ph.D.

Associate Professors:

Gerald P. Mohrmann, Ph.D.
Ralph S. Pomeroy, Ph.D.

Assistant Professor:

Harry W. Sharp, Jr., Ph.D.

**Assistant Professor:**

John L. Vohs, M.A. (*Acting*)

Lecturer:

Lenore Copeland, M.A.

The Major Program**Departmental Adviser.—Mr. Murphy.**

Lower Division Courses.—Required are courses 1A–1B and 15. Recommended: courses in classical languages.

Upper Division Courses.—Thirty-six units in rhetoric, including: (1) courses 110, 120 in the first quarter of upper division work; (2) at least one additional course from each of the following series: 110, 120, and 150; (3) course 190 in the senior year.

Required courses outside the Department of Rhetoric.—A coherent program of twelve quarter units selected in consultation with the Departmental adviser from appropriate courses outside the Department of Rhetoric. This program will ordinarily be chosen from a designated set of courses related to one of the four course series in the Department of Rhetoric (Series 110, 120, 150, or 160).

The Department will certify completion of a major program only on the basis of at least a C average in the upper division courses taken in the Department.

151. Wildlife in Land Use. (3) III.

Lecture—3 hours. Prerequisite: Biology 1 or a course in natural history. Wildlife and plant protection; population dynamics of vertebrates under various types of land use; applications of ecological principles to resource management—wildlife conflicts. Mr. Howard

151L. Wildlife Laboratory. (1) III.

Laboratory—3 hours. Prerequisite: course 151 which should be taken concurrently. Field trips, demonstrations and discussions of wildlife control problems and operations. Mr. Howard

Teaching Major.—Same as major.

Teaching Minor.—Thirty quarter units, including Rhetoric 1A–1B, 15, 41, and eighteen upper division units including either course 110 or 120.

Optional Minor.—Twenty or more quarter units, at least one course from each of the following sets:

- a. Lower division (Rhetoric 1A, 1B, 15, 41).
- b. History of rhetorical theory (Rhetoric 110, 111, 112, 113).
- c. History of public speaking (Rhetoric 120, 121, 122, 123, 125).
- d. Rhetorical theory (Rhetoric 150, 151, 152, 153).

Lower Division Courses**1A. Introduction to Public Speaking. (4) I, II, III.**

Lecture—4 hours. Practice in the preparation and delivery of speeches with an introduction to rhetorical theory and criticism as applied to public address. The Staff

1B. Introduction to Public Speaking. (4) II, III.

Lecture—4 hours. Prerequisite: consent of instructor or course 1A. Further study and practice in selected areas and media of speech communication. Mr. Vohs

2. Oral Interpretation. (4) I, II, III.

Lecture—2 hours. Theory and practice in the oral reading of literature. Mrs. Copeland

15. Introduction to Rhetorical Studies. (4) III.

Lecture—4 hours. Illustration of various means available for the study of oral communication processes. Survey of the rhetorical tradition leading to exercises in rhetorical criticism and audience analysis, with extensive use of television and small-group methods. Mr. Murphy

41. Introduction to Advocacy. (4) I, II.

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. Provision for practice in intercollegiate debate.

Mr. Sharp

Upper Division Courses**110. Classical Rhetorical Theory. (4) I.**

Lecture—4 hours. Origins of Greek and Roman rhetorical theory, with emphasis upon the contributions of Isocrates, Plato, Aristotle, Cicero, and Quintilian.

Mr. Murphy

111. Medieval and Renaissance Rhetorical Theory. (4) II.

Lecture—4 hours. Development of the European rhetorical tradition to 1700 through the contributions of such writers as Augustine, Alcuin, Wilson, and other Ciceronians, with attention to the anti-Ciceronian reaction represented by Ramus, Francis Bacon, and Fenelon.

Mr. Murphy

112. Early Modern Rhetorical Theory. (4) III.

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.

Mr. Pomeroy

113. Contemporary Rhetorical Theory. (4) I.

Lecture—4 hours. Current approaches to rhetorical theory, from the James-Winans theory of attention to the Hovland, Janis, Kelley studies of persuasion.

Mr. Sharp

***120. Classical Public Address. (4) I.**

Lecture—4 hours. Public address as a force in the development of Greek and Roman civilizations, with special attention to Demosthenes, the Attic Orators, and Cicero.

Mr. Murphy

121. British Public Address to 1914. (4) II.

Lecture—4 hours. British public address in the eighteenth and nineteenth centuries, with special attention to the parliamentary speaking of Burke, Fox, Pitt, Grattan, Peel, Disraeli, and Gladstone.

Mr. Pomeroy

122. American Public Address from Edwards to Lincoln. (4) II.

Lecture—4 hours. A survey of major speakers from the colonial period to the era of the Civil War.

Mr. Mohrman

123. American Public Address from Grady to Wilson. (4) III.

Lecture—4 hours. A survey of major speakers from the Reconstruction Period to the founding of the League of Nations.

Mr. Mohrman

125. Contemporary Public Address. (4) III.

Lecture—4 hours. Public address in the twentieth century, with special attention to the speeches of Churchill, Roosevelt, Hitler, and Ghandi.

Mr. Sharp

150. Modes of Discourse. (4) III.

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.

Mr. Vohs

151. Methods of Advocacy. (4) I.

Lecture—4 hours. Study of problems inherent in securing acceptance of ideas; consideration of logical and nonlogical means of persuasion.

Mr. Pomeroy

152. Study of a Major Rhetorician. (4) II.

Lecture—4 hours. Prerequisite: consent of instructor. Intensive study of a major theorist, such as Aristotle, Cicero, Whately, or Toulmin, with emphasis upon the relation of his theory to the cultural environment of his time.

Mr. Pomeroy

153. Experimental Studies in Rhetoric. (4) I.

Lecture—4 hours. Prerequisite: consent of instructor. Consideration of contributions derived from sociometric and psychometric approaches to analysis of rhetorical process.

Mr. Vohs

154. Forensics Laboratory. (1) I, II, III.

Laboratory—2 hours. Prerequisite: consent of instructor. Practice in the principles of forensics, including argumentation and debate. Inter-collegiate and tournament forensics. May be repeated for credit up to a total of six units.

Mr. Sharp

***160. Rhetorical Criticism. (4) I.**

Lecture—4 hours. Prerequisite: course 15; or consent of instructor. Methods of evaluating public address, with emphasis on such factors as structure, language, and effectiveness.

Mr. Mohrman

190. Senior Proseminar. (4) II, III.

Lecture—2 hours; seminar—2 hours. Prerequisite: required of majors with senior standing. Individual research on a rhetorical topic approved by a committee of the faculty.

The Staff (Mr. Murphy in charge)

199. Special Study for Advanced Undergraduates. (1-5) I, II, III.

The Staff (Mr. Murphy in charge)

**Graduate Course****299. Individual Study. (1-12) I, II, III. The Staff**

* Not to be given, 1968-69.

RUSSIAN

Department Office, 416 Sproul Hall

Associate Professor:

Valerie A. Tumins, Ph.D.

Assistant Professor:

Alex M. Shane, Ph.D.

◇ ◇ ◇

*Assistant Professors:*James P. Apostolos, M.A. (*Acting*)
Rodney L. Patterson, M.A. (*Acting*)*Departmental Major Adviser*.—Mr. Shane.*Graduate Adviser*.—Miss Tumins.*The Major Program.*

The requirements are Russian 1 through 6 (or the equivalent); Russian 40, 41, 42, and a minimum of 36 units of upper division course work including Russian 101A, 101B, 101C, 102 or 103, and 190.

Honors and Honors Program (see page 113).—The honors program comprises two quarters of study under course 194H, which will include a research paper.

The Master of Arts Degree

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.

Teaching Major.—Requirements for the teaching major are the same as those for the departmental major with the addition of course 300.

Teaching Minor.—Six quarter courses in the lower division or their equivalents. Usually these will consist of Russian 1, 2, 3, 4, 5, 6. A total of 20 upper division units is required, including courses 101A, 101B, 101C.

Subject Representative: Mr. Shane.**Lower Division Courses****1. Elementary Russian. (5) I.**

Recitation—3 hours; discussion—2 hours; optional language laboratory practice.

Mr. Patterson

2. Elementary Russian. (5) II.

Recitation—3 hours; discussion—2 hours; optional language laboratory practice.

Mr. Shane

3. Elementary Russian. (5) III.

Recitation—3 hours; discussion—2 hours; optional language laboratory practice.

Mr. Patterson

4. Intermediate Russian. (5) I.

Recitation—5 hours. Prerequisite: course 3.

Mr. Patterson

5. Intermediate Russian. (5) II.

Recitation—5 hours. Prerequisite: course 4.
Mr. Apostolos

6. Intermediate Russian. (5) III.

Recitation—5 hours. Prerequisite: course 5.
Mr. Apostolos

39. Great Russian Writers. (3) I.

Lecture—3 hours. Knowledge of Russian not required. An introduction to major prose and dramatic works of such writers as Gogol, Turgenev, Dostoevsky, Tolstoy, Chekhov, and Sholokhov.
Mr. Apostolos

40. Survey of Russian Literature to 1800. (4) I.

Lecture—3 hours. Knowledge of Russian not required. Offered in even-numbered years.
Miss Tumins

41. Survey of Russian Literature: Nineteenth Century. (4) II.

Lecture—3 hours. Knowledge of Russian not required. Offered in odd-numbered years.
Mr. Patterson

42. Survey of Russian Literature: Twentieth Century. (4) III.

Lecture—3 hours. Knowledge of Russian not required. Offered in odd-numbered years.
Mr. Shane

***1G. Russian for Graduate Students. No Credit. II.**

Lecture—3 hours. A course designed to prepare students for the graduate reading examination.

Upper Division Courses**101A. Advanced Grammar, Composition, and Conversation. (4) I.**

Lecture—3 hours. Prerequisite: course 6.
Mr. Apostolos

101B. Advanced Grammar, Composition, and Conversation. (4) II.

Lecture—3 hours. Prerequisite: course 6.
Mr. Apostolos

101C. Advanced Grammar, Composition, and Conversation. (4) III.

Recitation—3 hours. Prerequisite: course 6.
Miss Tumins

102. Russian Composition. (4) II.

Recitation—3 hours. Prerequisite: course 6. Offered in even-numbered years. Miss Tumins

^a Not to be given, 1968-69.

103. Literary Translation. (4) I.

Discussion—3 hours. Prerequisite: course 6. Translation of Russian literary texts into stylistically equivalent idiomatic English. Offered in even-numbered years. Mr. Shane

121. The Russian Novel: Pushkin to Turgenev. (4) I.

Lecture—3 hours. Knowledge of Russian not required. Offered in odd-numbered years. Mr. Shane

123. The Russian Novel: Saltykov to Pasternak.

(4) III.

Lecture—3 hours. Knowledge of Russian not required. Offered in even-numbered years.

Mr. Shane

125. Russian Drama of the Nineteenth Century.

(4) I.

Lecture—3 hours. Prerequisite: course 6. Offered in odd-numbered years. Miss Tumins

127. The Golden Age of Russian Poetry. (4) II.

Lecture—3 hours. Prerequisite: course 101A. Offered in even-numbered years. Study of Russian versification; readings from Pushkin, Lermontov, and other poets of the first half of the nineteenth century. Offered in odd-numbered years. Mr. Patterson

128. Modern Russian Poets. (4) III.

Lecture—3 hours. Prerequisite: Russian majors fulfill readings in Russian; knowledge of Russian not required. Readings in translation of the poetry of modern Russian poets belonging to various "schools" (e.g., Symbolism, Acmeism, Futurism) including such poets as Blok, Esenin, Akhmatova, Maiakovsky, Pasternak and Evtushenko. Offered in even-numbered years.

Mr. Patterson

140. Dostoevsky. (4) II.

Lecture—3 hours. Knowledge of Russian not required. Offered in odd-numbered years.

Miss Tumins

141. Tolstoy. (4) II.

Lecture—3 hours. Knowledge of Russian not required. Offered in even-numbered years.

Mr. Shane

190. Senior Proseminar. (4) III.

Group conference and assigned reading in preparation for the senior comprehensive examination. Mr. Patterson

194H. Special Study for Honors Students.

(5) I, II, III.

Prerequisite: open only to honors students. The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses***200. Old Church Slavic. (4) I.**

Lecture—3 hours. Morphology and syntax of Old Church Slavic. Miss Tumins

***201. Reading in Old Church Slavic. (4) II.**

Discussion—3 hours. Prerequisite: course 200. Reading and linguistic analysis of Old Church Slavic texts. Miss Tumins

202. Descriptive Russian Grammar. (4) III.

Lecture—3 hours. An introduction to modern Russian phonology and morphology. Mr. Shane

210A. Style and Syntax. (4) I.

Discussion—3 hours. An examination of stylistic differences between spoken and written Russian. Offered in even-numbered years.

Mr. Shane

210B. Style and Syntax. (4) II.

Discussion—3 hours. Prerequisite: course 210A. An examination of stylistic differences between spoken and written Russian. Offered in odd-numbered years. Miss Tumins

210C. Style and Syntax. (4) III.

Discussion—3 hours. Prerequisite: course 210B. An examination of stylistic differentiation between spoken and written Russian. Offered in odd-numbered years. Miss Tumins

***220. Old Russian Literature. (4) III.**

Seminar—3 hours. Prerequisite: course 201. Advanced study of intellectual movements and literary styles of works such as "The Song of Igor's Campaign," "Zadonschina," Epifany's "Lives," Ivan IV's cycle of epistles. May be repeated for credit. Miss Tumins

***221. Eighteenth Century Russian Literature.**

(4) III.

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.

Miss Tumins

222. Nineteenth Century Russian Literature. (4) I.

Seminar—3 hours. Advanced study in literary movement such as Romanticism, Naturalism, and Realism, or of a major writer such as Pushkin, Gogol, Dostoevsky, or Tolstoy. Courses may be repeated for credit.

Mr. Shane, Miss Tumins, Mr. Patterson

***223. Early Twentieth Century Russian Literature.**

(4) I.

Seminar—3 hours. Reading and analysis of the achievements selected from the literary renaissance beginning with the Russian Sym-

* Not to be given, 1968-69.

bolists and continued by such diverse groups as the Acmeists, the Futurists and the Serapion Brotherhood. Course may be repeated for credit.

Mr. Shane

224. Soviet Russian Literature. (4) II.

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. Course may be repeated for credit.

Mr. Shane

299. Research. (1-9) I, II, III.

The Staff

Professional Course

300. The Teaching of a Modern Foreign Language. (3) III.

Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.

Mr. Kawczynski

SANSKRIT—See Classics

SOCIOLOGY

Bennett M. Berger, Ph.D., *Chairman of the Department*

Department Office, 308 Voorhies Hall

Professors:

Bennett M. Berger, Ph.D.
Cesar Graña, Ph.D.
Edwin M. Lemert, Ph. D.

Associate Professors:

Guenther Roth, Ph.D.
Julius Roth, Ph.D.

Assistant Professors:

Bruce Hackett, Ph.D.
Kenneth C. W. Kammeyer, Ph.D.
J. Rolf Kjolseth, Ph.D.
Robert H. Maisel, Ph.D.
Joseph Zelan, Ph.D.

◇ ◇ ◇

Assistant Professors:

Isao Fujimoto, Ph.D. (*Acting Sociology and Applied Behavioral Sciences*)
James McEvoy, M.A. (*Acting*)

Lecturer:

Arthur Lipow, M.A.

Departmental Major Advisers.—(a) Undergraduate: Mr. J. Roth, (b) Pre-Social Welfare: Mr. Zelan, (c) Graduate: Mr. Berger, Mr. Lemert, Mr. Maisel.

The Major Program

Lower Division Courses.—Required: Sociology 1, 2, 12, 46A, 46B, and 46C or their equivalent; 8 units selected from Anthropology 2, Economics 1A, 1B, and Psychology 1A, 1B and 1C. Recommended: Anthropology 1 and Philosophy 12, 20A-20B-20C.

Upper Division Courses.—Required: 36 units of Sociology including 165A, 165B and 165C. Recommended: Anthropology 102, 119A, 119B,

124, 128A, 128B; History 101A, 101B; Philosophy 107C, 151, 156; Political Science 150, 161; Psychology 145; Mathematics 105A, 105B.

Pre-Social Welfare Students

Lower Division Courses.—Required: Sociology 1, 3, 46A, 46B, 46C, or their equivalent, and Psychology 1A, 1B and 1C. Recommended: Anthropology 2, Sociology 2, Economics 1A, 1B, Philosophy 12, Political Science 1A, 1B.

Upper Division Courses.—Required: Sociology 120A, 120B, 165A or 165B or 165C, 185, and Psychology 112, 147A, 147B, 165, 168; 8 additional units selected from Sociology 130, 131A, 131B, 140, 150, 152, 170; Psychology 145. Recommended: Anthropology 119A, 119B, 128A, 128B; Economics 116, 130A, 130B, 150A, 150B; Consumer and Family Sciences 136, 138A, 138B; Political Science 103, 104, 181.

Graduate Study.—The Department offers a program of study leading to the M.A. and Ph.D. degrees in sociology. Further information regarding graduate study may be obtained at the department office.

Teaching Major.—Requirements for the teaching major are the same as for the departmental degree plus Sociology 122 or 124, 130 and 140.

Teaching Minor.—Thirty units of sociology taken in consultation with the subject representative.

Subject Representative: Mr. J. Roth.

Lower Division Courses

1. Introduction to Sociology. (4) I, II, III.

Lecture—3 hours; discussion—1 hour. Principles and basic concepts of sociology. The study of groups, culture, collective behavior, classes and caste, community and ecology, role, status, and personality.

2. Introduction to Sociology: Social Organization.

(4) II, III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 1. A study of social organization and institutions, with attention to the application of concepts and related research findings.

3. Social Problems. (4) I, III.

Lecture—3 hours; discussion—1 hour. A general sociological consideration of contemporary social problems in relation to sociocultural change and programs for improvement.

12. Introduction to Sociological Theory. (4) III.

Lecture—4 hours. An introduction to classic texts and problems in the tradition of sociological inquiry. Representative works of important figures, such as Marx, Comte, Weber, and Durkheim; the relevance of these materials for contemporary sociology.

Mr. Maisel

25. Sociology of Popular Culture. (4) II.

Lecture—4 hours. The historical emergence of popular culture. "High" culture, "folk" culture and "mass" culture; the democratization of culture values; the organization of popular tastes; characteristic art forms of popular culture: literature, music, the graphic arts. The social structure of audiences.

Mr. Graña

46A. Introduction to Social Research. (4) I.

Lecture—4 hours. Prerequisite: 8 units of Sociology. Examination of the methodological problems of social research. Selection and definition of problems of investigation, data-gathering techniques, and sampling.

46B. Introduction to Social Research. (4) II.

Lecture—4 hours. Prerequisite: course 46A. Data-analysis techniques, measurement, scaling, multivariate analysis, and quantitative measures of association.

46C. Introduction to Social Research. (4) III.

Lecture—4 hours. Prerequisite: course 46B. An introduction to the statistical analysis of social data, emphasizing the logic and use of statistical measures and procedures especially relevant to sociological analysis.

Upper Division Courses**104. Empirical Social Research and Social Theory. (4) III.**

Lecture—4 hours. Prerequisite: courses 12 and 46C or its equivalent or consent of instructor. An examination of important works in sociology, in the light of the ways in which theory informs and shapes actual research operations, and the ways in which the results of empirical research mold social theory.

Mr. Zelan

***106. Quantitative Methods of Research. (4) II.**

Lecture—4 hours. Prerequisite: course 46C or equivalent. Logical and technical features of multiple and partial correlation and regression analysis. Scaling theory and factor analysis. Introduction to mathematical models in sociology.

***107. Modes of Sociological Analysis. (4) I.**

Lecture—4 hours. Prerequisite: junior or senior standing and 9 units of sociology. The place of sociology among the sciences and the humanities; generalization and explanation in sociology. Styles of sociological inquiry, functional analysis, historical sociology, social criticism.

Mr. Berger

108. Advanced General Sociology. (4) III.

Lecture—4 hours. Prerequisite: junior or senior standing and 9 units of sociology. Critical analysis of basic concepts in sociology: social organization, culture, socialization, stratification, and their application to specific problems. The bearing of such analysis on problems of social order and social change.

Mr. Berger

118. Political Sociology. (4) II.

Lecture—4 hours. Prerequisite: course 1; or consent of instructor. The 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 movements; analysis of concepts of alienation, revolution, ideology, ruling class, and elite.

Mr. G. Roth

120A. Deviation and Society. (4) I.

Lecture—4 hours. Prerequisite: course 2 and upper division standing. Theory and studies of deviation in relation to societal reaction, group processes, and social roles. Stigma and incapacity; cosmetic defect.

Mr. Lemert

120B. Deviation and Society. (4) II.

Lecture—4 hours. Prerequisite: course 2 and upper division standing. Continuation of course 120A. Deviation theory applied to selected crimes, prostitution, drugs, alcohol use, and mental disorders. Creativity and society.

Mr. Lemert

122. Sociology of Adolescence. (4) III.

Lecture—4 hours. Prerequisite: 8 units of sociology. 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.

8

123. American Society. (4) III.

Lecture—4 hours. Prerequisite: 8 units of social science; or consent of instructor. The institutional structure and social organization of the United States.

* Not to be given, 1968-69.

124. Sociology of Educational Institutions. (4) II.

Lecture—4 hours. Prerequisite: 4 units of sociology. Public schools as arenas of intergroup conflict and as instruments of social mobility. The meaning of local autonomy in the context of prevailing arrangements for certification and public support. The relevance of public education to the ethos and mythos of American society.

125. Sociology of Intellectual Life. (4) I.

Lecture—4 hours. Prerequisite: upper division standing and consent of instructor. 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.

Mr. Graña

126. Social Structure and Personality. (4) I.

Lecture—4 hours. Prerequisite: course 2. Exposition of concepts, theories, and research relating the disciplines of sociology and psychology. Mechanisms of social influence on behavior. Complementarity of personality and learned roles; processes of internalization of roles and norms.

130. Race Relations and Minority Groups. (4) I, III.

Lecture—4 hours. Prerequisite: 8 units of social science; or consent of instructor. A study of contacts and interaction between racial and ethnic groups; sources and effects of prejudice and discrimination; programs for reducing intergroup tensions.

131A. Sociology of Family and Kinship: General Principles. (4) I.

Lecture—4 hours. Prerequisite: course 2. Biological basis of familial functions; biological and sociological kinship. Familial and extra-familial determinants of age-graded and sex roles. Normative supports of reproductive institutions; types of descent groups and status ascription. Relation of kinship to other social institutions.

131B. Sociology of Family and Kinship: Industrial Societies. (4) II.

Lecture—4 hours. Prerequisite: course 2. Comparative family structure in simple and advanced societies; current trends in industrial societies. Relations of family and stratification: hypergamy, industrialized status ascription, geographical mobility. Detailed study of events of the family cycle in industrial societies.

140. Social Stratification. (4) III.

Lecture—4 hours. Prerequisite: course 1. 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.

Mr. Hackett

141. Industrialization and Social Change. (4) II.

Lecture—4 hours. Prerequisite: 4 units of sociology. The interrelations between technological and social change, the social conditions of economic development, and the social implications of automation in highly industrialized countries.

Mr. G. Roth

***142. Comparative Institutions and Social Structures. (4) I.**

Lecture—4 hours. Prerequisite: 8 units of sociology. The central institutions and cultural legacies of the principal complex societies. Western nations will be compared with the USSR and newly developing states with respect to their patterns of institutional persistence and change.

Mr. G. Roth

143. Urban Society. (4) I.

Lecture—4 hours. Prerequisite: 8 units of sociology. Urbanization as a social process; comparison of urban, suburban, metropolitan and rural phenomena; types of cities; the subcultures of cities; the urban future.

Mr. Hackett

144. Rural Society. (4) III.

Lecture—4 hours. The characteristics of rural social systems in contrast to urban; the nature of peasant and folk societies; the impact of social change upon rural community life considered from the standpoint of regional differences in the United States and selected world areas.

Mr. Fujimoto

145. Social Structure of the U.S.S.R. (4) II.

Lecture—4 hours. A survey of the major institutions of Soviet society, including the family, education, work, health and welfare, the arts, ethnic and national groups.

Mr. Zelan

146. Sociology of Religion. (4) II.

Lecture—4 hours. Prerequisite: 8 units of sociology; or consent of instructor. The relationship between social structure and religious life. Social class, political behavior, and religious affiliation. The passage from "sacred" to "secular" ways of life. Religion and social change in advanced societies. Churches as social organizations. "Established" churches and religious "cults."

Mr. Graña

148. Collective Dynamics and Social Movements. (4) III.

Lecture—4 hours. Prerequisite: course 1; or consent of instructor. Non-institutionalized forms of group behavior; social contagions, fashion movements, public opinion formation, reform and revolutionary movements. Their relations to social change in mass societies.

150. Criminology. (4) III.

Lecture—4 hours. Prerequisite: 8 units of social science; or consent of instructor. The socio-

* Not to be given, 1968-69.

logical analysis of criminal behavior in relation to social structure and the criminalization process.

Mr. Lemert

152. Juvenile Delinquency. (4) II.

Lecture—4 hours. Prerequisite: 8 units of sociology or psychology. 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, with special attention given to the juvenile court.

Mr. Lemert

154. Sociology of Medicine. (4) I.

Lecture—4 hours. Prerequisite: 4 units of sociology. An overview of sociological research in medicine and health care, with emphasis on the organizational and institutional aspects.

Mr. J. Roth

155. Sociology of Law. (4) III.

Lecture—4 hours. Prerequisite: 8 units of social science. 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.

Mr. Lemert

159. Sociology of Occupations. (4) II.

Lecture—4 hours. Prerequisite: 8 units of sociology or consent of instructor. The 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.

Mr. J. Roth

160. Work and Leisure. (4) II.

Lecture—4 hours. Prerequisite: course 1. Historical and comparative analysis of problems associated with quality of work and quantity of leisure; impact of cultural and social change on occupational pattern and leisure activity.

Mr. Berger

165A. Sociological Theory. (4) I.

Lecture—4 hours. Prerequisite: 8 units of sociology. Major sociological theorists of the nineteenth century. Conservative, liberal, and radical traditions of sociological thought. Thinkers discussed include Comte, Saint Simon, Marx, Spencer, and Toennies.

165B. Sociological Theory. (4) II.

Lecture—4 hours. Prerequisite: 8 units of sociology. Sociological theorists of the late nineteenth and early twentieth centuries. Theorists discussed include Weber, Durkheim, Pareto, and Simmel.

165C. Sociological Theory. (4) III.

Lecture—4 hours. Prerequisite: 8 units of sociology. The development of the American sociological tradition, with emphasis on major contemporary theorists. Theorists discussed include Mead, Cooley, Park, Merton, and Parsons.

***170. Population. (4) I.**

Lecture—4 hours. Prerequisite: 8 units of social science; or consent of instructor. 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) II.

Lecture—4 hours. Prerequisite: 4 units of sociology. 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.

Mr. McEvoy

174. Sociology of Language. (4) III.

Lecture—4 hours. Prerequisite: 6 units of sociology. The relation of language patterns to social patterns; "talk" as a multi-level social phenomenon; relationship of dialects to social groups; sociological analyses of stability and change in language; problems of learning and un-learning languages.

Mr. Kjolseth

175. Sociology of Communication. (4) I.

Lecture—4 hours. Prerequisite: course 46A, 46B, 46C. Studies of mass communications, media and public opinion; theories of information flow, ideology, group and personal influence on opinion formation.

Mr. McEvoy

180. Complex Social Organization. (4) II.

Lecture—4 hours. Prerequisite: course 1; or consent of instructor. Institutional analysis of administrative structures and voluntary associations; consideration of informal organization, ideologies, bureaucracy, decision-making, and morale in selected areas of government, industry, religion, and education.

Mr. Hackett

185. Sociology of Social Welfare. (4) I.

Lecture—4 hours. Prerequisite: course 3 and upper division standing. A sociological analysis of the evolution and current organization of welfare functions in modern societies.

Mr. Zelan

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Prerequisite: open to seniors only.

The Staff (Mr. Lemert in charge)

Graduate Courses

202A-202B-202C. Research as A Social Process.

(4-4-4) I-II-III.

Seminar—3 hours. Prerequisite: consent of the instructor. Through reading, research exercises, discussion, and field work projects developed and conducted by each student, the

* Not to be given, 1968-69.

student will examine the work of social scientists as a process of sociological and psychological contingencies.

Mr. J. Roth

205. Methodological Critique of Research. (4) III.

Lecture and discussion—3 hours. Prerequisite: course 46C; or consent of instructor. Methodological analysis and criticism of empirical research exemplifying different types of research design. Examination of surveys, experiments, historical and comparative studies, and studies using biographical and demographic data.

207. Methods of Survey Analysis. (4) I.

Lecture—3 hours. Principles and procedures in the analysis of survey data. Forms of multivariate relations; typologies; scaling; panel analysis; contextual analysis.

Mr. Zelan

220. Deviance, Law, and Social Control. (4) I.

Lecture and discussion—3 hours. Prerequisite: courses 120A and 120B; or consent of instructor. The relation of crime, mental disorder, and other forms of deviance to cultural values, norms, and legal institutions; formal and informal means for the social control of deviance.

Mr. Lemert

226. Social Interaction and Personality. (4) II.

Lecture and discussion—3 hours. Prerequisite: course 126; or consent of instructor. The influence of social structure, personality, and social interaction in face-to-face social situations; the relations of role-taking and personal autonomy to the development of the self; social-psychological processes in intimate and small-group situations.

242. Comparative Method in Historical Sociology.

(4) III.

Lecture and discussion—3 hours. Prerequisite: course 142; or consent of instructor. Com-

parative approaches to major historical phenomena such as nationalism, bureaucratization, feudalism, and capitalism; the relevance of psychological and sociological theories to historical interpretation; the verifiability of historically grounded hypotheses; the meaning of analogy, correspondence, and causality.

Mr. G. Roth

252. Sociology of Art. (4) III.

Lecture and discussion—3 hours. Prerequisite: course 25 and 125; or consent of instructor. The relationship of social class, institutions, and value system to art. The art of primitive, aristocratic, and democratic societies. Art and political ideology. The question of art as "representative" of social values. Artists as a social type.

Mr. Graña

265. Sociological Theory. (4) II.

Lecture and discussion—3 hours. Prerequisite: courses 165A, 165B, and 165C; 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.

288. Research Perceptoryship. (1-9) I, II, III.

Prerequisite: consent of the instructor.

The Staff

290. Seminar. (4) I, II, III.

Seminar—3 hours.

The Staff

298. Group Study. (1-5) I, II, III.

The Staff

299. Individual Study. (1-6) I, II, III.

The Staff (Mr. Berger in charge)

SOIL SCIENCE—See Resource Sciences

SPANISH

Donald G. Castanien, Ph.D., *Chairman of the Department*

Department Office, 622 Sproul Hall

Professors:

Donald G. Castanien, Ph.D.

Homero Castillo, Ph.D.

Iver N. Nelson, Ph.D. (*Emeritus*)

Associate Professor:

Daniel S. Keller, Ph.D.

Assistant Professors:

Didier T. Jaén, Ph.D.

Robert M. Scari, Ph.D.



Lecturers:

David H. Allen, Jr., M.A.

M. Roberto Assardo, M.A. (*Acting*)

Dale E. Enwall, M.A. (*Acting*)

Associates:

Paula Kelley, M.A.

Earl L. Rees, M.A.

Ronald R. Senft, B.A.

The Major Program

Lower Division Courses.—Required: Spanish 1, 2, 3, 4, 5, and 6, or their equivalents; 26A–26B–26C. Recommended: one year of college Latin or the equivalent.

Upper Division Courses.—Required: 36 units of upper division courses including 101A–101B, 180, one course in each of the following areas: literature of the Golden Age, twentieth-century Spanish literature, twentieth-century Spanish American literature. The remaining units may be from any of the upper division courses.

Honors and Honors Program (see page 113).—The honors program comprises two quarters of study under course 194H, which will include a research paper and a comprehensive examination.

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 its equivalent. Candidates 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 Graduate Adviser, Department of Spanish.

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 Graduate Adviser.

Teaching Major.—Requirements for the teaching major are the same as for the departmental major.

Teaching Minor.—Spanish 1, 2, 3, 4, 5, 6, 26A–26B–26C, or their equivalents. At least 16 units of upper division work, including Spanish 101A–101B, 134 or 135 and one of the following courses: Spanish 131A, 120A, 104C, or 122.

Subject Representative: Mr. Keller.

Portuguese**Lower Division Courses****1. Elementary Portuguese. (4) I.**

Laboratory—2 hours; recitation—3 hours. Portuguese grammar, conversation, and reading. No credit will be allowed if the student has completed two or more years of high school Portuguese.

Mr. Assardo

2. Elementary Portuguese. (4) II.

Laboratory—2 hours; recitation—3 hours. Prerequisite: course 1. A continuation of course 1.

Mr. Assardo

3. Elementary Portuguese. (4) III.

Laboratory—2 hours; recitation—3 hours. Prerequisite: course 2. A continuation of course 2.

Mr. Assardo

Upper Division Courses***104. Survey of Brazilian Literature: Prose Fiction. (4) I.**

Lecture—3 hours. Prerequisite: course 3. Mr. Assardo

105. Survey of Brazilian Literature: Poetry. (4) I.

Lecture—3 hours. Prerequisite: course 3. Mr. Assardo

***106. Survey of Brazilian Literature: Drama and Essay. (4) III.**

Lecture—3 hours. Prerequisite: course 3. Mr. Assardo

Spanish

Departmental Major Advisers.—Mr. Assardo, Mr. Jaén, Mr. Keller, Mr. Scari.

Graduate Adviser.—Mr. Castanien.

Lower Division Courses**1. Elementary Spanish. (4) I, II, III.**

Laboratory—2 hours; recitation—3 hours. The Staff

2. Elementary Spanish. (4) I, II, III.

Laboratory—2 hours; recitation—3 hours. Prerequisite: course 1. A continuation of course 1. The Staff

3. Elementary Spanish. (4) I, II, III.

Laboratory—2 hours; recitation—3 hours. Prerequisite: course 2. A continuation of course 2. The Staff

4. Intermediate Spanish. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 3. The Staff

5. Intermediate Spanish. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 4. Continuation of course 4. The Staff

6. Intermediate Spanish: Conversation and Reading. (3) I, II, III.

Recitation—3 hours. Prerequisite: course 5. Spoken Spanish stressed through class discussion of a variety of selected readings. The Staff

26A–26B–26C. Introduction to Spanish Literature. (3–3–3) I-II-III; II-III-I; III-I-II.

Lecture—3 hours. Prerequisite: course 6. The Staff

Upper Division Courses**101A–101B. Grammar and Composition. (4–4) I-II; II-III.**

Lecture—3 hours. Prerequisite: course 6. The Staff

* Not to be given, 1968–69.

104A. History of Spanish-American Literature: Colonial Period to the Nineteenth Century. (4) I.

Lecture—3 hours. Prerequisite: course 26C.
Mr. Keller

104B. History of Spanish-American Literature: the Nineteenth Century through Modernism. (4) II.

Lecture—3 hours. Prerequisite: course 26C.
Mr. Keller

104C. History of Spanish-American Literature: Modernismo to the Present. (4) III.

Lecture—3 hours. Prerequisite: course 26C.
Mr. Keller

***105. Spanish Drama of the Nineteenth Century. (4) I.**

Lecture—3 hours. Prerequisite: course 26C.
Offered in even-numbered years. Mr. Scarl

***109A-109B. Spanish Drama of the Golden Age. (4-4) II-III.**

Lecture—3 hours. Prerequisite: course 26C.
Offered in even-numbered years.

111. Don Quijote. (4) II.

Lecture—3 hours. Prerequisite: course 26C.
Offered in odd-numbered years. Mr. Castanien

***112. Prose of the Golden Age. (4) II.**

Lecture—3 hours. Prerequisite: course 26C.
Offered in even-numbered years. Mr. Castanien

115. Lyric Poetry of the Golden Age. (4) I.

Lecture—3 hours. Prerequisite: course 26C.
Offered in even-numbered years.

***119. Spanish Novel of the Nineteenth Century. (4) I.**

Lecture—3 hours. Prerequisite: course 26C.
Offered in odd-numbered years. Mr. Scarl

120A. Twentieth-Century Spanish Prose. (4) I.

Lecture—3 hours. Prerequisite: course 26C.
Offered in even-numbered years.

120B. Twentieth-Century Spanish Drama. (4) II.

Lecture—3 hours. Prerequisite: course 26C.
Offered in odd-numbered years.

120C. Twentieth-Century Spanish Poetry. (4) III.

Lecture—3 hours. Prerequisite: course 26C.
Offered in odd-numbered years. Mr. Enwall

***122. Spanish-American Fiction of the Twentieth Century. (4) II.**

Lecture—3 hours. Prerequisite: course 26C.
Offered in even-numbered years. Mr. Assardo

125A. Modernism: The Precursors. (4) I.

Lecture—3 hours. Prerequisite: course 26C.
Mr. Castillo

125B. Modernism: The Major Poets. (4) II.

Lecture—3 hours. Prerequisite: course 26C.
Mr. Castillo

127. Poetry of Post-Modernism and Vanguardism. (4) III.

Lecture—3 hours. Prerequisite: course 26C.
Mr. Castillo

131A. Modern Spanish Syntax. (4) I.

Lecture—3 hours. Prerequisite: course 101B.

131B. Modern Spanish Syntax. (4) II.

Lecture—3 hours. Prerequisite: course 101B.

132. Introduction to Spanish Linguistics. (3) III.

Lecture—3 hours. Prerequisite: course 101B. 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. Mr. Craddock

134. Survey of Spanish Culture. (4) II.

Lecture—3 hours. Prerequisite: course 26C.
Mr. Jaén

135. Survey of Spanish-American Culture. (4) III.

Lecture—3 hours. Prerequisite: course 26C.
Mr. Assardo

***141. Introduction to Old Spanish Language. (4) II.**

Lecture—3 hours. Prerequisite: courses 26C and 101B. Major phonological and morphological developments in Spanish with special attention to the verb system. Emphasis on the period of old Spanish from the twelfth to the sixteenth century. Offered in even-numbered years.

***142. Medieval Spanish Literature. (4) III.**

Lecture—3 hours. Prerequisite: courses 26C and 101B. Literary analysis of representative works of medieval Spanish literature. Offered in even-numbered years.

150. Masterpieces of Spanish Literature. (4) I.

Lecture—3 hours. Reading, lectures, and discussion in English. May not be counted as part of the major in Spanish. Mr. Castanien

151. Study of a Major Writer. (4) I, II, III.

Lecture—3 hours. Prerequisite: course 26C. May be repeated for credit with consent of the instructor. The Staff

^a Not to be given, 1968-69.

180. History of Spanish Literature. (4) III.

Lecture—3 hours. Prerequisite: open only to majors in their senior year; consent of instructor.
Mr. Scari

194H. Special Study for Honors Students.

(5) I, II, III.

Prerequisite: open only to honors students. Guided research leading to an honors thesis.
The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses**200. Techniques of Literary Scholarship. (4) III.**

Lecture—3 hours. The elements of bibliography and fundamental methods of literary research.
Mr. Castanien

***210. Literary Criticism: Poetry. (4) I.**

Seminar—3 hours. Offered in odd-numbered years.
Mr. Castillo

230A. History of the Spanish Language. (4) I.

Seminar—3 hours. Prerequisite: Latin 1.

230B. History of the Spanish Language. (4) II.

Seminar—3 hours. Prerequisite: Latin 1.

***231A-231B. Spanish Literature of the Golden Age.**

(4-4) II-III.

Seminar—3 hours. Offered in odd-numbered years.
Mr. Castanien

234A. Twentieth-Century Spanish Poetry. (4) I.

Seminar—3 hours. Offered in even-numbered years.
Mr. Enwall

234B. Twentieth-Century Spanish Poetry. (4) II.

Seminar—3 hours. Offered in odd-numbered years.
Mr. Enwall

***235A. Twentieth-Century Spanish Prose. (4) I.**

Seminar—3 hours. Offered in odd-numbered years.

***235B. Twentieth-Century Spanish Prose. (4) II.**

Seminar—3 hours. Offered in even-numbered years.

***238A. Spanish-American Drama: 1880-1930. (4) III.**

Seminar—3 hours. Offered in odd-numbered years.
Mr. Keller

***238B. Spanish-American Drama: 1930 to Present.**

(4) III.

Seminar—3 hours. Offered in even-numbered years.
Mr. Keller

***239. Nineteenth-Century Spanish Literature. (4) II.**

Seminar—3 hours. Offered in even-numbered years.
Mr. Scari

241A. Spanish American Novel, 1900-1920. (4) I.

Seminar—3 hours. Offered in even-numbered years.
Mr. Castillo

241B. Spanish American Novel, 1920-1940. (4) II.

Seminar—3 hours. Offered in odd-numbered years.
Mr. Castillo

242. New Trends in Spanish American Fiction from 1940 to the Present. (4) III.

Seminar—3 hours. Offered in odd-numbered years.
Mr. Castillo

***245. Darío and His Contemporaries. (4) II.**

Seminar—3 hours. Offered in even-numbered years.
Mr. Castillo

***247. New Directions in Spanish American Poetry.**

(4) III.

Seminar—3 hours. Offered in even-numbered years.
Mr. Castillo

299. Research. (2-5) I, II, III.

The Staff

Professional Course***300. The Teaching of Modern Foreign Language.**

(3) III.

Lecture—3 hours. Prerequisite: senior or graduate standing; a major or minor in a modern foreign language.
The Staff

SUBJECT A

Department Office, TB 123, Room 105-106

Instruction Supervisor:

Leonard G. Homann, A.B.

* Not to be given, 1968-69.

Subject A. English Composition (no credit). I, II, III.

Lecture—2 hours; discussion—2 hours. Principles of composition, with special emphasis on precision and exactness of sentences. The Staff

TEXTILES AND CLOTHING—See Family and Consumer Sciences**VEGETABLE CROPS—See Plant Sciences****VETERINARY MICROBIOLOGY**

John W. Osebold, D.V.M., Ph.D., *Chairman of the Department*
Department Office, 2004 Haring Hall

Professors:

Norman F. Baker, D.V.M., Ph.D.
Ernst L. Biberstein, D.V.M., Ph.D.
Hugh S. Cameron, D.V.M., Ph.D.
(Emeritus)
James R. Douglas, Ph.D.
Michel M. J. Lavoipierre, M.B., Ch.B.
Delbert G. McKercher, D.V.M., Ph.D.
John W. Osebold, D.V.M., Ph.D.
Clyde Stormont, Jr., Ph.D.

Assistant Professors:

Audria M. Matheson, Ph.D.
Yuan C. Zee, D.V.M., Ph.D.

**Lecturers:**

Margaret E. Meyer, Ph.D.
Richard N. Rossan, Ph.D.

Upper Division Courses**111. Immunogenetic and Electrophoretic Techniques. (2) I.**

Lecture—1 hour; laboratory—3 hours. Prerequisite: Animal Genetics 107 (may be taken concurrently) or consent of the instructor. Immunologic and electrophoretic techniques used in the exploration of heritable differences in red cell antigens, serum proteins and enzymes of domestic animals. Mr. Stormont

120. Principles and Techniques of Bacteriology.**(2) I.**

Lecture—3 hours; laboratory—6 hours (completed in 4 weeks). Prerequisite: second-year standing in the School of Veterinary Medicine or consent of the instructor. The lectures deal with the historical evaluation of microbiology, fundamental physical and physiological properties of bacteria, microbial classification, and nomenclature. The laboratory exercises are designed to acquaint the student with basic methods used in studying bacteria.

Miss Matheson

121. Immunity and Serology. (3) I.

Lecture—3 hours; laboratory—6 hours (completed in 6 weeks). Prerequisite: course 120 or consent of the instructor. The principles of immunity and serology. Mr. Osebold, Mr. Stormont

122. Bacterial and Mycotic Pathogens of Domestic Animals. (4) II.

Lecture—4 hours; laboratory—8 hours (completed in 5½ weeks). Prerequisite: course 121, or consent of instructor. The biology of infectious animal diseases caused by bacteria and fungi.

Mr. Biberstein, —————

123. Fundamentals of Virology and Virologic Techniques. (3) II.

Lecture—4 hours; laboratory—8 hours (completed in 4½ weeks). Prerequisite: course 122, or consent of the instructor. The basic physical and physiological properties of viruses and the virus-host relationship; laboratory methods of propagating viruses, with respect to their immunologic, serologic and pathologic properties.

Mr. Zee

124. Veterinary Protozoology. (2) II.

Lecture—1 hour; laboratory—3 hours. Prerequisite: second-year standing in the School of Veterinary Medicine or consent of the instructor. The protozoan parasites of domestic animals with emphasis on biology, life history, identification, and control. Mr. Baker, Mr. Rossan

125. Veterinary Helminthology and Entomology. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: second-year standing in the School of Veterinary Medicine or consent of the instructor. The helminth and arthropod parasites of domestic animals with emphasis on biology, life history, identification, and control.

Mr. Baker, Mr. Douglas, Mr. Lavoipierre

127. Medical Microbiology. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biology 1, Bacteriology 2; Zoology 2 recommended. Principles of infection and resistance; nature and manifestations of immunity and allergy; the bacterial and mycotic pathogens of man.

Mr. Biberstein, Miss Matheson

128. Biology of Animal Viruses. (3) II.

Lecture—3 hours. Prerequisite: course 127 or the equivalent. Fundamental physical and chemical properties of animal viruses; methods of propagation, purification and assay. Mechanisms of viral replication and pathogenesis of

virus infections in man and animals. Immunity to virus diseases and oncogenic properties of animal viruses.

Mr. Zee

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

The Staff

Graduate Courses

201. Clinical Microbiology. (2) II.

Laboratory—6 hours. Prerequisite: course 121, junior standing in School of Veterinary Medicine. Principles and methods of etiological diagnosis of bacterial, mycotic, viral, protozoan, helminthic, and ectoparasitic infections affecting domestic animals.

The Staff

Mr. Osebold, Miss Matheson

270. Advanced Immunology. (6) III.

Lecture—3 hours; laboratory—9 hours. Prerequisite: courses 120-123 or 127 or consent of the instructor. Dynamics of infection and resistance: antibody production and manifestations of antigen-antibody reactions, immuno-chemistry, hypersensitivity. Immunological considerations of the groups of disease agents. Offered in even-numbered years.

Mr. Osebold, Miss Matheson

290. Seminar. (1) I, II, III.

Seminar—1 hour.

The Staff

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-12) I, II, III.

The Staff

VITICULTURE AND ENOLOGY—See Food Science and Plant Science

WATER SCIENCE AND ENGINEERING—See Resource Sciences

WILDLIFE AND FISHERIES BIOLOGY—See Resource Sciences

ZOOLOGY

Herman T. Spieth, Ph.D., *Chairman of the Department*

Everett W. Jameson, Jr., Ph.D., *Vice-Chairman of the Department*

Department Office, 2320 Storer Hall

Professors:

- Charles R. Goldman, Ph.D.
- Milton Hildebrand, Ph.D.
- Everett W. Jameson, Jr., Ph.D.
- Loye H. Miller, Ph.D., LL.D. (*Emeritus*)
- Milton A. Miller, Ph.D.
- Lauren E. Rosenberg, Ph.D.
- Herman T. Spieth, Ph.D.
- Tracy I. Storer, Ph.D., LL.D. (*Emeritus*)
- ^{2, 3}Kenneth E. F. Watt, Ph.D.

Associate Professors:

- Ronald J. Baskin, Ph.D (*Zoology and Animal Physiology*)
- William J. Hamilton, III, Ph.D.
- Robert L. Rudd, Ph.D.
- George W. Salt, Ph.D.

Assistant Professors:

- Peter B. Armstrong, Ph.D.
- Dennis Barrett, Ph.D.
- David W. Deamer, Ph.D.

²Absent on leave, fall quarter 1968.

³Absent on leave, winter quarter 1969.

Robert D. Grey, Ph.D.

William M. Hamner III, Ph.D.

Ann E. Kammer, Ph.D.

Stephen L. Wolfe, Ph.D. (*Zoology and Genetics*)



Professors:

- Norman F. Baker, D.V.M., Ph.D.
(*Veterinary Microbiology*)
- James R. Douglas, Ph.D. (*Veterinary Microbiology*)

Lecturer:

William M. Longhurst, Ph.D.

Bachelor of Arts Major Program

Lower Division Courses.—Required: Biology 1, Zoology 2, Botany 2 or Bacteriology 2, Chemistry 1A, 1B, and 8, Physics 2A, 2B, and 2C, Mathematics 13 or 16A and 16B.

Upper Division Courses.—Required: 1) 36 units in zoology (not more than 5 units of courses in the 190 series may be counted in this requirement), 2) Genetics 100A-100B, 3) one

course or course sequence selected from each of the four following core areas:

- 1) Morphology: Zoology 100, 106A, 106B, 107, 110, 112, Botany 130A.
- 2) Physiology with laboratory, Zoology 103, 121 and 121L, 142 and 142L, 160, Animal Physiology 110A, 110B, 111A, and 111B (all four courses).
- 3) Evolution: Zoology 106A, 112, 148, Genetics 103.
- 4) Ecology: Zoology 114, 116, 125, 133, 134, 140, 155.

Cross-listed courses may be used to satisfy only one core area requirement. Any course taken outside the department in partial satisfaction of the core course requirement will be counted toward the satisfaction of the 36-unit requirement.

Recommended: Biochemistry 101A, 101B.

Bachelor of Science Major Program

Lower Division Courses.—Required: Biology 1, Zoology 2, Botany 2, Bacteriology 2, Chemistry 1A, 1B, and 8, Physics 2A, 2B, 2C, Mathematics 13 or 16A and 16B.

Upper Division Courses.—Required: 1) 36 units, 18 of which must be in upper division courses in zoology. Not more than 5 units of courses in the 190 series may be counted in the 36-unit requirement. 2) Biochemistry 101A and 101B, Genetics 100A–100B. 3) One course in the evolution core area listed under the description of the Bachelor of Arts program. 4) One course or course sequence in each of two of the three remaining core areas listed under the description of the Bachelor of Arts program.

Cross-listed courses may be used to satisfy only one core area requirement. Any course taken outside the department in partial satisfaction of a core area requirement will be counted toward the satisfaction of the 36-unit requirement.

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.

Teaching Major.—Requirement for students planning to be primary or secondary teachers, with a major in zoology, are the same as for the Bachelor of Arts degree in zoology.

Teaching Minor.—Required: 30 units in biological sciences, including Biology 1, Zoology 2, and 18 units of upper division courses in zoology or closely related fields chosen in consultation with the subject representative. Recommended: an upper division course in invertebrate zoology and an upper division course in each of as many other areas of zoology as possible (e.g., cell biology, physiology, ecology, genetics, morphology, evolution).

Students who plan to be teachers should consult the Department of Education in regard to further preparation for certification.

Subject Representative: Mr. Wolfe.

Physiology

Lower Division Courses

2. Introductory Physiology. (4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: Biology 1. The physiology of muscular contraction, nervous integration, sensation, circulation, respiration, excretion, and digestion. Miss Kammer

2L. Introductory Physiology Laboratory. (2) I.

Laboratory—6 hours. Prerequisite: Physiology 2; completed or in progress. Miss Kammer

10. Elementary Physiology. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: not open for credit to students who have had Biology 1. An introductory course in physiology for nonscience majors. Mr. Hamner

Zoology

Lower Division Course

2. General Zoology. (6) I, II, III.

Lecture—4 hours; laboratory—6 hours. Prerequisite: Biology 1. A survey of the diversity of animal life and the basic principles of adaptation, evolution, and integration in animals.

I. Mr. Salt; II. Mr. Miller; III. Mr. Hamner

Upper Division Courses

100. Vertebrate Embryology. (5) I, III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Embryonic development of vertebrates with emphasis on amniotes.

I. Mr. Grey; III. Mr. Armstrong

103. Developmental Biology. (5) I.

Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: course 100; Genetics 100B or 115, and consent of instructor. Mechanisms of growth and differentiation; experimental manipulation and biochemical analysis of a variety of embryonic materials.

Mr. Barrett

106A. Analysis of Vertebrate Structure. (5) II.

Lecture—2 hours; laboratory and demonstration—6 hours. Prerequisite: course 2. The interpretation of vertebrate structure with emphasis on phylogeny. Mr. Hildebrand

106B. Analysis of Vertebrate Structure. (4) III.

Lecture—2 hours; laboratory and demonstration—4 hours. Prerequisite: course 2. The interpretation of vertebrate structure with emphasis on function. Mr. Hildebrand

107. Microanatomy. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. The finer structure and activities of organs, tissues, and cells of vertebrates, with emphasis on those of mammals.

Mr. Rosenberg

110. Protozoology. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: Biology 1. Structure, life history, and ecology of the groups of protozoa with emphasis on relationships to biological problems.

Mr. Rosenberg

112. Invertebrate Zoology. (5) I.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Comparative anatomy, classification, and phylogeny of the invertebrate Metazoa.

Mr. Miller

114. Invertebrate Physiological Ecology. (5) II.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 112. Physiology, behavior, and ecology of the invertebrate Metazoa.

Mr. Hammer

116. Principles of Animal Resource Management. (5) I.

Lecture—3 hours; laboratory—3 hours; special projects. Prerequisite: Biology 1; Mathematics 13 and 16A. Population dynamics and management of marine, freshwater, and terrestrial animal resources; analysis and solution of problems in maximization of animal resource production.

Mr. Watt

121. Cell Biology. (4) II.

Lecture—4 hours. Prerequisite: Biochemistry 101A, 101B, and Genetics 100B. The mechanics of living systems. A combined ultrastructural, physiological, and biochemical analysis of sub-cellular organization, including such topics as nucleic acid "code," synthesis of specific macromolecules, contractility, photosynthesis and respiration, cell division, molecular structure of organelles, and cell regulatory mechanisms.

Mr. Deamer

121L. Cell Biology Laboratory. (2) II.

Laboratory—6 hours. Prerequisite: course 121. Exercises illustrating principles of cell biology; individual programs of research, employing one or more advanced techniques.

Mr. Deamer

125. Animal Ecology. (3) II.

Lecture—3 hours. Prerequisite: course 2 and one course in biological science having at least part of the studies conducted in the field (e.g., courses 112, 133, 134, 140L, Botany 108 or Botany 117.) Theory of relationships between animals and their environments.

Mr. Salt

125L. Field Ecology. (3) III.

Laboratory—9 hours. Prerequisite: course 125. Laboratory and field investigations of ecological phenomena.

Mr. Salt

133. Biology of the Cold-Blooded Vertebrates. (5) III.

Lecture—2 hours; laboratory—6 hours; field trips. Prerequisite: course 2. Identification; ecologic and geographic distribution; field study of habits and life histories; emphasis on species in California and western North America.

Mr. Jameson

134. Biology of Birds and Mammals. (5) III.

Lecture—3 hours; laboratory—6 hours. Prerequisite: course 2. Identification; ecologic and geographic distribution; field study of habits and life histories; emphasis on species in California and western North America. Field trips included.

Mr. Rudd

140. Limnology. (4) III.

Lecture—3 hours; special projects. Prerequisite: Biology 1 and junior standing. The biology and productivity of inland waters with emphasis on the physical and chemical environment.

Mr. Goldman

140L. Limnology Laboratory. (3) III.

Laboratory—6 hours. Prerequisite: course 140 (may be taken concurrently). Limnological studies of lakes, streams, and reservoirs with interpretation of aquatic ecology. Mr. Goldman

***142. Invertebrate Physiology. (4) III.**

Lecture—3 hours. Prerequisite: course 112; Chemistry 1A, 1B; Physics 2B. Recommended: Physiology (Animal) 100B. Comparison of the physiology of invertebrate organ systems. Offered in odd-numbered years.

Miss Kammer

***142L. Invertebrate Physiology Laboratory. (3) III.**

Laboratory—8 hours. Prerequisite: course 142 (may be taken concurrently). Studies and experiments on the physiological mechanisms of invertebrate organ systems. Offered in odd-numbered years.

Miss Kammer

144. Oceanography. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: Biology 1. Biological, chemical, physical, and geological aspects of the marine environment. Consideration of biological communities, productivity, the distribution of currents and tides, the origin of ocean basins, and marine sedimentation.

Mr. Goldman

147. Zoogeography. (4) II.

Lecture—3 hours. Prerequisite: course 2 or Entomology 1. Movements of terrestrial animals. The role of geologic, climatic, and biologic changes in the geographic distribution of animals.

Mr. Jameson

* Not to be given, 1968-69.

148. Animal Phylogeny and Evolution. (5) I.

Lecture—5 hours. Prerequisite: course 2 or Entomology 1. Recommended: course 147 and Genetics 100B. The origins and relationships of the major groups of animals, with emphasis on the analysis of variation and the mechanics of evolutionary change.

Mr. Rudd

155. Animal Social Systems. (4) I.

Lecture—3 hours; laboratory—3 hours. Prerequisite: course 2. The behavioral basis, organization, and evolution of animal societies. Offered in odd-numbered years. Mr. Hamilton

156. Dynamics of Animal Coloration. (5) I.

Lecture—3 hours; discussion—1 hour; special project or term paper. Prerequisite: course 2. The role of animal coloration with respect to animal behavior; predator-prey relationships, and solar and animal radiation. Particular emphasis is given to the evolution of behavior and population dynamics as exemplified by coloration. Offered in even-numbered years.

Mr. Hamilton

158. Introduction to Physico-Chemical Biology.

(4) I.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 2; Physics 2B; Chemistry 8B. Recommended: Mathematics 21B or 16B. The application of physico-chemical principles to the study of living organisms.

Mr. Baskin

160. Invertebrate Neurophysiology. (5) III.

Lecture—2 hours; discussion—1 hour; laboratory—6 hours. Prerequisite: an upper division course in physiology or physico-chemical biology or invertebrate zoology. Comparisons of the nervous systems of invertebrates with emphasis on nervous processes related to behavior. Offered in even-numbered years. Miss Kammer

197. Senior Colloquium in Zoology. (2) III.

Lecture and discussion—2 hours. Prerequisite: senior standing. The consideration of innovation and synthesis in broad areas of zoology.

The Staff

199. Special Study for Advanced Undergraduates.

(1-5) I, II, III.

Directed study of a specific topic selected by the student and the instructor.

The Staff

Graduate Courses

202. Biomathematics. (6) II.

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.

Mr. Watt

210. Analysis of the Elements of Effective Teaching of College Biology. (3) I.

Lecture—1 hour; discussion—1 hour; assignments and reports. Undergraduate enrollment limited. Offered in even-numbered years.

Mr. Hildebrand

222. Mathematical Models of Ecosystems. (4) III.

Lecture—1 hour; laboratory—3 hours. Prerequisite: Mathematics 21B or 16B; 105B or 231C; Zoology 116 or 125. Use of mathematical models and computer simulation to discover effect of varying behavioral, physiological, population, and community parameters on energy flux in ecosystems. Offered in odd-numbered years.

Mr. Watt

223. Seminar in Fisheries Management. (4) III.

Seminar—4 hours. Prerequisite: course 116; Mathematics 16B, 105B. Analysis of fish population problems, including review of recent research. Offered in even-numbered years.

Mr. Watt

225. Cellular Aspects of Development. (4) II.

Lecture—3 hours; discussion—1 hour. Prerequisite: Zoology 103 and 121, or equivalent. Interaction of cells and tissues in development; cellular basis of morphogenesis. Mr. Armstrong

226. Nuclear Aspects of Development. (4) III.

Lecture—3 hours; discussion—1 hour. Prerequisite: course 103 and Biochemistry 101B, or equivalents with consent of instructor. Open to qualified undergraduates. Critical examination of the evidence for inputs to the nucleus and outputs from the nucleus in the control of development.

Mr. Barrett

230. Advanced Cytology. (2) I.

Seminar—2 hours. Prerequisite: consent of instructor. Topics of current interest in the ultrastructure of cells.

Mr. Wolfe

231. The Ultrastructure of Self-Replicating Systems. (3) III.

Lecture—3 hours. Recommended: courses in cytology, cell biology or cytogenetics and Genetics 100B. Structure and function of self-replicating subcellular organelles illustrated primarily in metazoan animals.

Mr. Wolfe

240. Muscle Physiology. (4) II.

Lecture—3 hours; laboratory—3 hours. Prerequisite: an upper division course in animal physiology; Mathematics 21B or 16B; or consent of instructor. The physical and chemical aspects of muscle function.

Mr. Baskin

250. Recent Developments in Zoology. (1) II.

Seminar—1 hour. Prerequisite: graduate standing in Zoology.

The Staff

287. Seminar in Animal Behavior. (1) II, III.

Seminar—1 hour. Prerequisite: consent of instructor. Reports and discussion on the principles and recent developments in invertebrate and vertebrate animal behavior.

Mr. Hamilton, Mr. Spieth

288. Seminar in Physicochemical Biology. (2) III.

Seminar—2 hours. Prerequisite: consent of the instructor. Discussion of recent literature on the physicochemical aspects of the organization and function of living systems. Physicochemical properties on the molecular and cellular levels will be considered.

Mr. Baskin

289. Seminar in Analysis of Vertebrate Structure.

(1) I.

Seminar—1 hour. Prerequisite: course 106A; course 106B recommended. Offered in odd-numbered years.

Mr. Hildebrand

291. Seminar in Protozoology. (2) I.

Seminar—2 hours. Prerequisite: course 110; or consent of instructor.

Mr. Rosenberg

292. Seminar in Development. (1) II.

Seminar—1 hour. Prerequisite: consent of instructor. Reports and discussion on embryology, morphogenesis, and developmental mechanisms.

Mr. Barrett

293. Seminar in Invertebrate Zoology. (2) II.

Seminar—2 hours. Prerequisite: course 112; or consent of instructor. Critical review of the literature in selected topics and taxa in the Invertebrata. Open to qualified undergraduate.

Mr. Hamner, Mr. Miller, Miss Kammer

294. Seminar in Animal Ecology. (3) I.

Seminar—3 hours. Prerequisite: course 125; or consent of instructor. Readings and discussions of advanced topics in the population and community ecology of animals.

Mr. Rudd, Mr. Salt

295. Seminar in Limnology. (3) III.

Seminar—3 hours. Prerequisite: course 140; or consent of instructor. Recent developments in limnology and related advances in oceanography.

Mr. Goldman

297. Seminar in Systematic Zoology and Evolution.

(2) III.

Seminar—2 hours. Prerequisite: consent of instructor. Principles of animal classification, speciation, and the evolution of higher categories; emphasis on modern concepts and pertinent contributions from the fields of genetics and paleontology.

Mr. Rudd

298. Group Study. (1-5) I, II, III.

The Staff

299. Research. (1-9) I, II, III.

The Staff

Index

- Absence, leave of (*see Withdrawal*)
Academic Senate, 18
Adding or dropping courses, 28
 in Letters and Science, 106
Administration, University, 17
Administrative officers, general, 9
 at Davis, 10
 of the colleges and schools, 11
Admission to the University, 19-27
 application procedures, 25
 by examination, 21
 change of campus, 26
 eligibility, notification of, 26
 failure to register, 26
 in advanced undergraduate standing, 26
 in freshman standing, 19
 in graduate standing, 24
 in limited status, 24
 in special status, 24
 intention to register, statement of, 26
 intercampus transfer, 27
 of applicants for second bachelor's degree, 25
 of applicants from other countries, 23
 of out-of-state applicants, 21
 preparatory high school subjects, 22
 reapplication, 26
 transcript of record for, 25
 vaccination certificate, 26
- Admission requirements in the
 College of Engineering, 87
 Graduate Division, 134
 Professional schools, 110-112
 School of Law, 117
 School of Medicine, 121
 School of Veterinary Medicine, 127
- Advanced undergraduate standing, requirements for admission, 26
- Advisers, faculty (*see also* under various departments)
 College of Agricultural and Environmental Sciences, 83
 College of Engineering, 89
 College of Letters and Science, 106
 for foreign students, 48
- Aerospace Engineering, curriculum, 91
- Agricultural
 Biosciences, curriculum in, 58-61
 Business Management, requirements for the major, 61, 63
 Chemistry, graduate group, 145
 Economics, Department of, 145, 230
 courses in, 145, 150
 requirements for the major, 61, 63
- 343
- Economics and Business Management,
 curriculum in, 61-63
Education, courses in, 165
 requirements for the major, 64
Education and Development curriculum in, 63-66
Engineering, Department of, 148, 201
 courses in, 148, 201
 curriculum, 91
Placement Service, 46, 83
Practices, Department of, 149
 program, 83
Science and Management, committee, 149
 courses in, 150
 curriculum in, 66-69
 major in, 66-68
Sciences, curriculum in, 58-70
Toxicology, committee, 151
Agricultural and Environmental Sciences,
 College of, 53-85
 college requirements, 82
 curricula and majors, 54-81
 dismissal and probation rules, 32
 fields of study, 54
 graduate instruction and degrees, 56, 85
 honors, 84
 requirements for Bachelor of Science degree, 53
 scholarships, 84
 study-list requirements, 83
 teaching credentials, 85
Agronomy, Department of, 299
 courses in, 301
American History and Institutions, 34, 193, 258, 307
American History and Literature, committee, 151
 courses in, 152
 major program, 152
Anatomy, Department of, 152
 courses in, 152
Animal Biochemistry, courses in, 157
Animal Genetics, courses in, 157
Animal Husbandry, Department of (*see* Animal Sciences)
Animal Physiology, Department of, 154
 courses in, 159
Animal Science, Department of, 154
 courses in, 150, 156
 requirements for the major, 58, 59
 specialization in, 67, 69
Animal Sciences, committee, 154
Anthropology, Department of, 162
 courses in, 162
 major program, 162

- Application for admission, procedures, 25-26
 Graduate Division, 135
 Law, 117
 Medicine, 121
 Veterinary Medicine, 127
- Applied Behavioral Sciences, Department of, 165, 230
 courses in, 231
- Applied Science, Engineering, Department of, 203
 courses, 203
 graduate study, 99
- Approved living quarters, 43
- Archaeology, courses in (*see Anthropology*)
- Architecture, courses in (*see Art*)
- Area requirements, Letters and Science, 114
- Art, Department of, 166
 courses in, 167
 major program, 167
- Assistantships, teaching and research, 138
- Associated Students, 49
- Astronomy, courses in, 294
- Athletic Association, Women's, 51
- Athletics (*see also Physical Education*)
- Atmospheric Science, committee, 317
 courses in, 319
 major requirements, 73, 75
- Attorney in Residence Matters, 29
- Avian Medicine (*see Epidemiology and Preventive Medicine*)
- Awards (*see Honors and Prizes*)
- Bachelor of Arts degree, requirements (*see also under various departments*)
 College of Letters and Science, 101
 general University, 33
- Bachelor of Science degree, requirements
 College of Agricultural and Environmental Sciences, 53
 College of Engineering, 87
 College of Letters and Science, 101
 general University, 33
 School of Veterinary Medicine, 121
- Bachelor's degree, applicants for a second, 25
- Bacteriology, Department of, 171
 courses in, 172
 major programs, 171
- Biochemistry, major requirements, 71
- Biochemistry, Animal, courses in, 157
- Biochemistry and Biophysics, Department of, 173
 courses in, 173
- Biochemistry, Comparative, graduate group, 189
- Biological Sciences, committee, 175
 courses in, 175
 major programs, 175
- Biology, courses in, 176
 curriculum in, 71-72
 Quantitative, 71
- Biophysics (*see Biochemistry and Biophysics*)
- Biosciences, Agricultural (*see Agricultural Biosciences*)
- Board and room, 37
- Botany, Department of, 176
 courses in, 177
 major programs, 176
- Breadth requirements, Letters and Science, 101
- Brewing technology specialization, 69
- Business Administration, School of preprofessional requirements, 110
- Business Management (*see Agricultural Economics and Business Management*)
- Calendar, 5
- Campuses of the University, 17
- Candidacy for degrees, filing of announcement, 36
 Bachelors' degrees, Letters and Science, 105
- Chancellors, University, 10
- Change of campus before registration, 26
 college, school, or major, 28
 major in Letters and Science, 104
 name, 28
- Chemical Engineering, Department of, 206
 courses in, 207
 curriculum, 93
- Chemistry, Department of, 180
 courses in, 180
 major programs, 180
- Chemistry, Agricultural, graduate group, 145
- Child Development, requirements for the major, 55, 57
- Chinese, courses in (*see Oriental Languages*)
- Civil Engineering, Department of, 208
 courses in, 208
 curriculum, 94
- Classes, Department of, 183
 courses in, 184
- Clinical Pathology, Department of, 186
 courses in, 186
- Clinical Sciences, Department of, 187
 courses in, 187
- Comparative Biochemistry, graduate group, 189
- Composition, English, required, 34
- Conduct and discipline, 49

- Consumer Economics, courses in, 232
 Consumer Sciences, Department of, 231
 Counseling Service, 47
 Courses, classification and numbering, 143
 Credentials, teaching, 112, 137
 Credit
 and scholarship, 31
 by examination, 33, 35, 109
 for work taken in other colleges, 22, 144
 upon repetition of a course, 31
 value of courses, explained, 143
 Curricula (*see various Colleges and Schools*)
 preparation for University, 22
 preprofessional, 110-112
 Dairy technology specialization, 69
 Deans of the colleges, schools, and graduate division, 11
 Defense Language Institute, 17
 Deficiencies
 disciplinary action, 31
 of transfer students, 23
 removal of grade deficiencies, 31
 Degree candidacy, filing for, 36
 Bachelors' degrees, Letters and Science, 105
 Degree requirements
 Bachelor of Arts
 College of Letters and Science (*see also various departments*), 101
 general University, 33
 Bachelor of Science
 College of Agricultural and Environmental Sciences, 81
 College of Engineering, 87
 College of Letters and Science, 101
 general University, 33
 School of Veterinary Medicine, 127
 Graduate degrees (*see Graduate Division, also various Colleges and Schools*)
 Dental Hygiene, 110
 Dentistry, School of, preprofessional requirements, 111
 Departmental majors, Letters and Science, 104
 Design
 courses in, 232
 requirements for the major, 55, 57
 teaching faculty, 230
 Dietetics and Nutrition, requirements for the major, 55, 57
 Dining Commons, 43
 Discipline
 for scholastic deficiencies, 31
 degrees of, 48
 Discontinuance without notice (*see Withdrawal*)
 Dismissal for scholastic deficiency, 31
 Dramatic Art, Department of, 189
 courses in, 190
 major program, 189
 University Theatre, 14, 190
 Dravidian languages, course in (*see Oriental Languages*)
 Dropping courses
 general regulations, 28
 Letters and Science, 106
 Economics, Department of, 193
 courses in, 194
 major program, 193
 Economics, Agricultural (*see Agricultural Economics*)
 Consumer, courses in, 232
 Economics of Agricultural Management, specialization in, 67, 68
 Education, Department of, 197
 courses in, 198
 Agricultural (*see Agricultural Education*)
 Education Abroad Program, 16, 48
 Educational Placement Service, 46
 Electrical Engineering, Department of, 213
 courses in, 213
 curriculum, 95
 Eligibility for admission, notification of, 26
 Employment, student, 46
 College Work-Study program, 46, 55
 Engineering, College of, 199
 courses in, 199-219
 Engineering, College of, 87-99
 admission to, 87
 applied science, 99
 college requirements, 88
 dismissal and probation rules, 31
 graduate study, 99
 honors with bachelor's degree, 88
 humanistic-social studies, 89
 lower division program, 90
 minimum scholarship requirements, 35
 requirements for Bachelor of Science degree, 88
 study-list requirements, 89
 technical electives, 89
 upper division curricula, 91-99
 Engineering
 aerospace, curriculum, 91
 Agricultural, Department of, 148, 201
 courses in, 148, 201
 curriculum, 90
 Applied Science, Department of, 203
 courses in, 203
 Chemical, Department of, 206
 courses in, 207
 curriculum, 93

- Civil, Department of, 208
 courses in, 208
 curriculum, 94
 core courses, 199
- Electrical, Department of, 213
 courses in, 213
 curriculum, 95
- Mechanical, Department of, 216
 courses in, 216
 curriculum, 97
- English, Department of, 219
 courses in, 220
 major program, 219
- English Examination, Subject A, 34
 for foreign students, 23, 34
- English requirement
 for admission to the University, 19
 in the College of Engineering, 90
 in the College of Letters and Science, 102
- Enology (*see* Viticulture and Enology)
 specialization, 69
- Enrollment limitation in School of Veterinary Medicine, 127
- Entomology, Department of, 225
 courses in, 226
 requirements for the major, 58, 60
- Entrance examinations
 for California residents, 20
 for nonresidents, 21
- Entrance requirements (*see* Admission)
- Environment engineering specialization, 94
- Epidemiology and Preventive Medicine, 228
 courses in, 228
- Examinations
 advanced placement, 109
 American History and Institutions, 34, 244, 258, 307
 credit by, 33, 35
 English composition, Subject A, 34
 entrance, 21
 final, 33
 foreign language placement, 28, 107
 in English for foreign students, 23
 Law School admission, 117
 medical required, 28, 45
 Medical School admission, 122
 regulations concerning, 15
- Expenses of students (*see also* Fees), 37
- Extension courses, acceptability of
 approval required, 144
 in the College of Letters and Science, 102
 taken at another institution, 22
- Extension, University, 17
- Extra-session courses defined, 144
- Faculty advisers (*see* Advisers, faculty)
- Family and Consumer Sciences, committee, 230
 courses in, 231
 curriculum in, 55-58
- Farm management (*see* Agricultural Economics)
- Fees and deposits
 application for admission, 25
 Subject A course, 34, 37
 health insurance, 37
 incidental, 37
 intention to register, 26
 late registration, 27
 Memorial Union, 37
 nonresident, 29
 parking, 37
 reapplication, 26
 refunds, 38
 registration, 37-38
 residence hall contract, 43
 student body membership, 37
 tuition, 29
 transcript of record, 32
- Fellowships, assistantships, and loans, 138
- Final examinations, regulations concerning, 33
- Financial aids, 37
 application for, 38
- Food science, committee, 237
 curriculum in, 69-70
 requirements for major, 69
- Food Science and Technology, Department of, 237
 courses in, 150, 238
- Food technology specialization in, 68, 69
- Foods, courses in, 233
 requirements for the major, 55, 57
- Foreign language
 Letters and Science requirement, 102
 placement test, 28, 107
 professional courses in teaching (*see under* various departments)
 requirement for admission, 19
 training at Defense Language Institute, 17
- Foreign literature in translation, courses in, 241
- Foreign students
 admission to the Graduate Division, 135
 adviser for, 48
 American History and Institutions, 35
 courses in English for, 220
 examination in English for, 23
 health insurance required, 45
 requirements for admission, 23
 rules governing residence, 29
 Subject A examination, 34

- Forestry (*see* Preforestry)
 Fraternities, 44
 French (Department of French and Italian),
 courses in, 242
 major program, 242
 Freshman standing, admission to, 19
 Fruit and Vegetable Technology, 69
- Genetics, Department of, 245
 courses in, 245
 courses in animal genetics, 157
 courses in plant genetics (*see* Plant Sciences)
- Geography, Department of, 247
 courses in, 247
 major program, 247
- Geology, Department of, 249
 courses in, 250
 major programs, 249
- German and Russian), Department of, 252
 courses in, 253
 major program, 253
- Government of the University, 17
- Grade points defined, 31
 computation of grade-point average, 31
- Grades defined, 31
 Pass or not passed, 31, 82, 103, 127
- Graduate degrees offered, 133
- Graduate Division, 133–138
 fellowship, assistantships, and loans, 138
 graduate groups, list of, 134
 majors and degrees, 133
 program of study, 136
 requirements for admission, 135
 requirements for foreign students, 135
 teacher credential program, 137
- Graduate students
 financial aids, 40, 138
 grades of Satisfactory or Unsatisfactory, 31
 readmission, 135
 scholarship deficiencies, 31
- Graduate study
 College of Agricultural and Environmental Sciences, 85
 College of Engineering, 99
 Engineering, Applied Science, 99
 School of Veterinary Medicine, 127
 without degree objective, 136
- Graduation, University requirements for,
 33–35
- Grants, 40
- Greek, courses in, 184
 major program, 183
- Group majors in
 College of Letters and Science, 105
 Graduate Division, 134
- Gymnasium, use of, 289
- Health insurance, supplementary, 45
 fee, 37
 required for foreign students, 45
- Health Service, Student, 45
- Hebrew, courses in (*see* Oriental Languages)
- High School
 preparation for engineering, 87
 preparatory subjects for University curricula, 22
 requirements for admission, 19
- History, Department of, 258
 courses in, 258
 major program, 258
- History and government of the University, 17
 of the Davis campus, 13
- History requirement for admission, 19
- Home Economics, requirements for the major, 55, 57
- Home Economics Education, courses in, 234
- Home Management, courses in, 234
- Honor Spirit, 15
- Honors
 at entrance, 36
 at graduation, 36
- College of Agricultural and Environmental Sciences, 84
- College of Engineering, 88
- College of Letters and Science, 113
 deans lists, 36
 prizes, 36
- Honors courses defined, 144
- Honors programs, Letters and Science, 113
- Honors students
 credit by examination, 33–35
 Pass or not passed grades, 32, 82, 103, 127
 privileges, Letters and Science, 113
- Housing, information, 43
- Human anatomy, courses in, 277
- Human development, courses in, 234
- Humanistic-social studies, College of Engineering, 89
- Humanities, Letters and Science
 breadth requirement, 102
 list of courses, 114
- Incidental fee, 37
- Incomplete, grade of, 31
- Index, departments by college and school, 139
- Individual group majors, Letters and Science, 105
- Institution Management, courses in, 235
- Insurance, health (*see* Health Insurance)

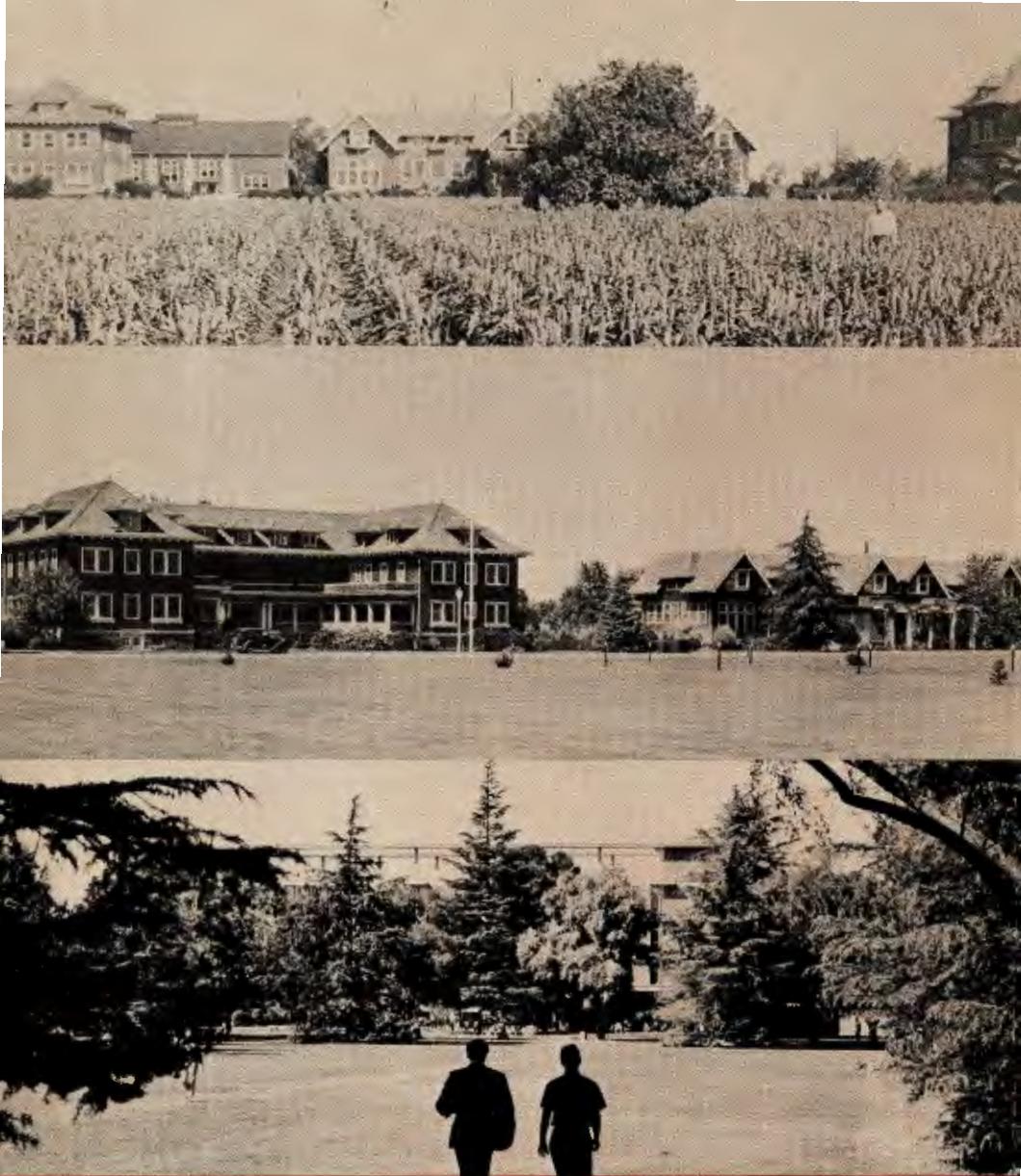
- Intention to register form, 26
- Intercampus transfer, 27
- Intercampus exchange program for graduate students, 137
- Interdepartmental majors, Letters and Science, 105
- International Agricultural Development, committee, 265
 - courses in, 265
 - graduate group, 134, 265
 - requirements for the major, 63, 65
- International Relations, committee, 265
 - major program, 266
- International student services, 48
- International students, adviser for, 48
- Irrigation (*see* Water Science and Engineering)
- Italian (Department of French and Italian), courses in, 266
- Japanese, courses in (*see* Oriental Languages)
- Laboratory science, requirement for admission, 19
- Landscape Horticulture, (*see* Environmental Horticulture)
 - major requirements, 60
- Language requirement for admission, 19
- Late admission and registration, 27
- Latin, courses in, 185
 - major program, 184
- Law, School of, 117-119
 - Department of, 268
 - courses in, 268
 - residence rules for LL.B. candidates, 35
- Leave of absence (*see* Withdrawal)
- Letters and Science, College of, 101-115
 - advanced placement examinations, 109
 - area requirement lists of courses, 102, 114
 - breadth requirements, 101, 102
 - college requirements, 102
 - faculty advisers, 106
 - honors, 113
 - majors available, 105
 - minimum scholarship requirements, 103
 - planning the program, 106
 - preprofessional study, 110
 - probation and dismissal rules, 31
 - requirements for the bachelor's degree, 102
 - teaching departments, 115
- Library, University, 15
- Limited status, requirements for, 24
- Linguistics, committee, 270
 - courses in, 270 (*see also* Anthropology)
- Livermore, courses in Engineering, Applied Science, 204
- Living accommodations, 43
- Loans, 40-43
 - for graduate students, 138
- Lower division courses defined, 143
- Lower division requirements (*see under* various Colleges and Schools)
- Major, change of, 28, 104
- Management, Business (*see* Agricultural Economics and Business Management)
- Management, Home, courses in, 234
- Management, Institution, courses in, 235
- Married students, housing for, 43
- Mathematics, Department of, 271
 - courses in, 272
 - major programs, 271
- Mathematics requirement for admission, 19
- Meat and poultry products technology specialization, 69
- Mechanical Engineering, Department of, 216
 - courses in, 216
 - curriculum, 97
- Medical examination, required, 28, 45
- Medicine, School of, 121, 277
 - courses in, 277
 - Preprofessional requirements, 111, 121
- Medical Technology, preparation for postgraduate training in, 112
- Memorial Union
 - Dining Commons, 43
 - fee, 37
- Microbiology, graduate group, 278
 - courses in, 278
- Microbiology, Veterinary (*see* Veterinary Microbiology)
- Mid-term warning notices, 33
- Military Science, Department of, 278
 - courses in, 279
- Military training
 - Army ROTC program, 48, 278
 - scholarships, 42
- Minimum undergraduate scholarship requirements, 31
- Music, Department of, 280
 - courses in, 281
 - major program, 281
- Name change, 28
- Natural sciences, Letters and Science breadth requirement, 102
 - list of courses, 114
- Nematology, Department of, 283
 - courses in, 284
- Nonresident students
 - admission requirements, 21
 - rules governing residence, 29
 - tuition fee for, 29, 38

- Nursing, School of, preprofessional requirements, 111
- Nutrition (*see also* Dietetics and Nutrition), Department of, 231, 155
- courses in (Animal Sciences), 158
 - courses in (Family and Consumer Sciences), 235
 - graduate group, 284
 - major requirements, Dietetics and Nutrition, 55, 57
 - major requirements, 59
- Off-campus living accommodations, 44
- Officers, administrative, 9
- Optometry, School of, preprofessional requirements, 111
- Oriental languages, courses in, 284
- Out-of-state applicants
- admission requirement, 21
 - rules governing residence, 29
- Park and Recreation Administration, Committee, courses in, 319
- major requirements, 73, 76
- Parking fee, 37
- Pass or not passed grades, 32, 82, 103, 127
- Pathology, Clinical (*see* Clinical Pathology)
- Pathology, Department of, 286
- courses in, 286
- Pharmacy, School of, preprofessional requirements, 112
- Philosophy, Department of, 286
- courses in, 287
 - major program, 287
- Physical Education, Department of, 289
- courses in, 290
 - major program, 290
- Physical examination required, 28, 45
- Physical Sciences, committee, 292
- major program, 292
- Physical Therapy, School of, preprofessional requirements, 112
- Physics, Department of, 293
- courses in, 294
 - major programs, 293
- Physiological Sciences, Department of, 297
- courses in, 297
- Physiology
- courses in (Animal Sciences), 159
 - courses in (Zoology), 338
 - major requirements, 71, 72
- Placement examination in foreign languages, 28
- Placement Services, Students and Alumni, 46-47
- Plant genetics, courses in (*see* Plant Sciences)
- Plant Pathology, Department of, 299
- courses in, 304
- Plant Physiology, graduate group, 134
- Plant Protection, requirements for the major, 58, 61
- Plant Science
- courses in (Agricultural Science and Management), 150
 - courses in (Plant Sciences), 301
 - courses in (Soil Science), 320
 - requirements for the major, 58, 60
 - specialization in, 68, 69
- Plant Sciences, committee, 298
- Political Science, Department of, 307
- courses in, 308
 - major program, 307
- Pomology, Department of, 300
- courses in, 305
- Portuguese, courses in, 333
- Poultry Husbandry, Department of, 155
- Preforestry
- major requirement, 73, 79
- Preparation for
- College of Engineering, 87
 - professional schools not at Davis, 110
 - School of Law, 117
 - University curricula, 22
- Preveterinary medicine curriculum, 81, 128
- Prizes, 36
- medals, 36
- Probation, rules governing, 31
- Professional courses
- defined, 144
 - in foreign language teaching (*see under* various departments)
- Professional schools, preparation for admission,
- Business Administration, 110
 - Dental Hygiene, 110
 - Dentistry, 111
 - Forestry, 79
 - Law, 117-119
 - Medicine, 111, 127
 - Nursing, 111
 - Optometry, 111
 - Pharmacy, 112
 - Physical Therapy, 112
 - Veterinary Medicine, 127
- Psychology, Department of, 313
- courses in, 314
 - major program, 314
- Public Health (*see* Epidemiology and Preventive Medicine)
- Quantitative Biology, curriculum in, 71-72
- Quarter system, explanatory note, 31, 143
- Quarter units, how to convert, 31

- Range Management, committee, 317
 courses in, 320
 requirements for the major, 73, 76
- Readmission
 after an absence, 29
 after dismissal, 32
 health requirement, 45
 Letters and Science, 104
 of graduate students, 135
- Reapplication for admission, 26
- Reexaminations, 31
- Refunds of fees, 38
- Regents of the University, 9
- Registration procedure, 27
- Renewable Natural Resources,
 committee, 318
 courses in, 320
 curriculum in, 73
 major requirements, 73, 77
- Reports of student grades, 31
- Requirements for
 for admission, 19-27
 for graduation, 33-35
- Research assistantships, 138
- Reserve Officers' Training Corps, 47, 48, 278
- Residence
 costs, 37-38
 halls, 43
 requirement for graduation, 35
 requirement in Letters and Science, 104
 rules governing, 29
 statement of, 29
- Resource Sciences, committee, 317
 courses in, 319
 curriculum in, 73-81
 specialization in, 69
- Resource technology specialization, 68
- Rhetoric, Department of, 324
 courses in, 324
 major program, 324
- ROTC Army program, 47, 48, 278
 scholarship program, 48
- Russian (Department of German and
 Russian), 326
 courses in, 326
 major program, 326
- Sanskrit, courses in, 186
- Satisfactory and Unsatisfactory, grades of, 31
- Scholarship
 deficiencies, 31
 grades of, 31
 honors and prizes, 36
 mid-term warning notices, 33
 requirements for admission, 19
 requirement for graduation, 33
- Scholarships, 39
 in the College of Agricultural and Environmental Sciences, 84
- President's, 39
- Regents, 39
- ROTC program, 42
- Science requirement for admission, 19
- Sculpture, courses in (*see Art*)
- Second bachelor's degree, applicants for, 25
- Selective Service, 47
- Social sciences, Letters and Science
 breadth requirement, 102
 list of courses, 114
- Social Welfare, preparation for postgraduate training in, 112
- Sociology, Department of, 328
 courses in, 328
 major program, 328
- Soil Science, courses in, 320
- Soil and Water Science, committee, 318
 courses in, 150, 321
 major requirements, 73, 78
- Soils and Plant Nutrition, Department of, 318
- Spanish, Department of, 332
 courses in, 333
 major program, 333
- Special admission categories, 24
- Special-study courses defined, 143
- Speech (*see Rhetoric*)
- Statement of
 intention to register, 26
 residence, 29
- Structural engineering and mechanics
 specialization, 95
- Student
 activities, 45, 49
 conduct and discipline, 48
 employment, 46
 expenses, 37
 Health Service, 45
 Honor Council, 49
 housing, 43
 publications, 50
- Student Body membership fee, 37
- Student Honor Council, 49
- Study-list regulations
 at registration, 27
- College of Agricultural and Environmental Sciences, 82
- College of Engineering, 89
- College of Letters and Science, 106
- Subject A
 at registration, 28
 department of, 335
 fee, 37
 requirements for graduation, 34

- Summer Sessions, 16
 course acceptability in Letters and Science, 101
 courses and residence requirement, 35
 credit from other institutions, 144
 Symbols, footnotes, 144
- Tamil, courses in (*see* Oriental Languages)
- Teacher education
 credentials, 112, 137
 credentials in College of Agricultural and Environmental Sciences, 85
 curricula in College of Agricultural and Environmental Sciences, 85
 in College of Letters and Science, 112
 requirements (*see under various departments*)
- Teaching assistantships, 138
- Telugu, courses in (*see* Oriental Languages)
- Tests (*see* Examinations)
- Textile Science, requirements for the major, 55, 58
- Textiles and Clothing, courses in, 236
- Theatre, University, 14, 190
 Wyatt Pavilion, 14
- Toxicology, Agricultural (*see* Agricultural Toxicology)
- Transcripts of record, 25, 32
 for admission, 26
 for transfer students, 26
 for intercampus transfer, 27
 from the University, 32
- Transfer students
 application for admission, 26
 American History and Institutions requirement, 34
 requirements for admission, 19
 Subject A, 34
 Transfer credits, Letters and Science, 101
- Transfer to another campus, 26
 regulations for students dismissed or on probation, 32
- Tuition, for nonresidents, 29, 38
- Undeclared status, Letters and Science, 106
- Units of credit, 143
 computation of grade-point average, 31
 maximum and minimum limitations, 28
- Agricultural and Environmental Sciences, 82
 Engineering, 88
- Letters and Science, 102
 University requirement for graduation, 33-35
- University Extension, 17
 course acceptability, 22, 102, 144
- University of California, history and government
 the Davis campus, 13
 the statewide University, 17
- University Theatre, 14, 190
- Upper division courses defined, 143
- Vaccination certificate required, 26 45
- Vegetable Crops, Department of, 300
 courses in, 305
- Veterans benefits, 42
- Veterinary Medicine, School of, 127-131
 admission to, 127
 graduate study, 131
 minimum scholarship requirements, 32
 plan of study, 128
 requirements for D.V.M., 129
 requirements for the Bachelor of Science, 131
 selection of applicants for, 127
- Veterinary Microbiology, Department of, 336
 courses in, 336
- Viticulture and Enology, Department of, 238, 300
 courses in, 240, 306
- Warning notices, mid-term, 33
- Water resources engineering specialization, 95
- Water Science and Engineering, Department of, 318
- Water Science, courses in, 322
- Welfare Council (*see* Student Honor Council), 48
- Wildlife and Fisheries Biology, committee, 318
 courses in, 323
 major requirements, 73, 79
- Withdrawals, 28
- Women's Athletic Association, 50
- Work-Study Program, 46, 83
- Wyatt Pavilion Theatre, 14, 190
- Zoology, Department of, 337
 courses in, 338
 major programs, 337

CAMPUS MAP



In one of his last speeches Adlai Stevenson referred to Franklin, Jefferson, Madison, Adams, Hamilton, and Marshall in these words: "Our revolutionary leaders must have been, bar none, the most soundly educated group of radicals the world has ever seen. And I believe that that precise and precious balance between vision and practicability that we find in our early constitutional experiments reflects above all the wisdom and realism of well-nourished minds."

At a time when students are asking for a share in determining the form and means by which knowledge is transmitted, it is appropriate for us to consider Stevenson's words. The collaboration between Students and Faculty can well be important in determining the proper diet for "Well-Nourished Minds" today. The particular strength of students is in contributing new ideas generated by their practical concerns. The faculty, on the other hand, offers the wisdom to evaluate traditional forms of education. The result can be a better diet, balanced between "Wisdom and Realism."

EMIL M. MRAK